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BETTER FRUIT

The Pioneer Horticultural Journal of the Pacific Northwest

AUG 19 1922

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Features In This Issue:

Future of Fruit Growing
Prune Industry In Washington
Feeding of Strawberry Plants
Ousting the Prune Root Borer
Factor of Dehydrator Efficiency
Disease Factor in Commercial Pomology



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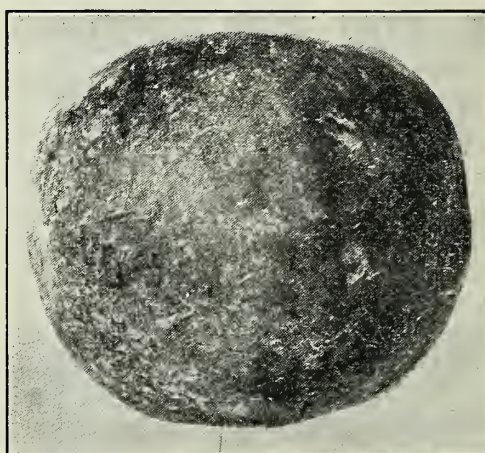
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Disease Factor in Commercial Pomology

By THORLAND R. HALL

Instructor in Horticulture, Iowa State College, Ames

THE commercial fruit-grower cannot pay too much attention to the factor of disease if he is to realize the greatest returns for his efforts. Fruits are subject to disease injury from the time of their formation until they have reached the consumer. It is beyond the scope of this paper to attempt a discussion of diseases that hinder fruit production, but the purpose is to discuss some of the general principles in relation to diseases of fruit after it has been produced.

Ward and Jones have defined diseases as, "Any deviation from the normal structure or function of plants or plant parts sufficient to threaten their life or impair their economic usefulness."

From this definition, it is plainly evident that diseases may be of a pathological nature or they may be physiological troubles. Diseases have been classified by others according to whether they were caused by bacteria, fungus organisms or physiological troubles.

The classification of Dr. O. F. Burger, pathologist, Bureau of Plant Industry, United States Department of Agriculture, is suitable for this discussion. He attempts to classify diseases found on the market under three heads: (1) There are those diseases which occur in the field and do damage to the fruit. They are brought to the market from the field. When the fruit is packed in the packing shed it looks just as it does when it is unpacked on the market. (2) The second type of diseases comprises those which originate in the field, but through storage and improper environment, spread and cause decay. Brown rot of peaches and stem rot of citrus fruits are examples. (3) The third type of diseases of fruit consists of those which arise during transportation and are induced by the methods of transportation and marketing. Such troubles as blue mold and rhizopus rot is considered in this group.

Insofar as this paper deals with diseases of commercial pomology, the second and third types in the classification are the only ones to be considered.

Losses in the fruit industry, as everyone knows, are by no means confined to the period of growth on the vine, plant or tree. Some of the most serious losses and certainly some that are most regrettable occur after the fruit has been picked. The problem of diseases that attack and spoil fruit after picking and before they reach the consumer is very ably handled by Professor Hall in this article. He gives careful exposition of the conditions which cause such diseases and consequent losses. He also gives in plain, understandable language the cautions every fruit packer and shipper needs to heed. The article is one of very timely value.

The commercial pomologist is concerned with harvesting operations, storage and transportation of fruits. Therefore it is the intention to indicate the relation of each of these operations to fruit diseases.

RELATION OF HARVESTING TO DISEASES—Harvesting operations include the picking, grading, packing and transportation of fruit from the field to the packing shed. In removing the fruit from the tree, too much emphasis cannot be placed upon the care of handling. Much fruit is ruined by careless handling. It is estimated that careless handling reduces the market value 50 to 75 per cent.

Much of the rough handling is due to lack of knowledge of what constitutes good handling. Many forms of decay are caused by a mold, a fungus which, as a rule, does not gain entrance to the fruit except through injuries of the skin. Any precautions to preserve the skin in a sound, unbroken, unbruised condition will reduce the mold injury to a minimum.

Some fruits require greater care in harvesting than others. The pickers of citrus fruits wear gloves to prevent break-

age of the skin. Citrus fruits are especially susceptible to the attacks of blue mold, and every precaution is necessary to avoid punctures in the skin. As soon as the blue mold does get started, decay rapidly follows and the market value of the fruit is lost.

WITH other fruits, it is a practice to pick them with the stem left on the fruit. Every stem pulled out of the fruit breaks the skin and this allows decay organisms to enter. The more perishable fruits are in the list of those where the stem is left on. Others that are picked with the stem are those that naturally part from the tree readily. Apples, pears, quince, cherry, lemon, citron, lime, plum, persimmon, grape, strawberry, and figs, are all marketed with the stem left on the fruit. The stems are removed from oranges, pomelo, peach, apricot, prunes, olives, raspberry, dewberry, almond and walnut.

Not only is the grower responsible for the care in harvesting the fruit, but he must pick when it is at the proper stage of maturity. No other factor is more difficult to determine than the proper time to pick. The proper stage of ripeness depends upon the variety of the fruit and the distance it must be shipped. Each grower, in order to be able to judge the proper stage of maturity, must study his own fruit and conditions.

The ground color of the fruit is one indication of the fruit maturity. Allowances must be made for the differences in natural color, exposures to sunlight and other regulating factors. Apples picked too green will invariably develop more scald in storage than fruit picked at the proper stage of maturity. Apple scald is one of the most serious troubles in either common or cold storage. On the other hand, over-ripe fruit is nearer the end of its life cycle and consequently will go down with greater rapidity than immature fruits.

Other indications of the maturity of fruit are the ease with which it parts from the vine or tree, the softness of the

fruit or the color of the pits. Under normal conditions a pear or apple will part from the tree with a slight twist if it is nearly ripe. Ripe berries, including raspberries, blackcaps and dewberries will part from the cone easily if they are mature, and, if they are immature, the stem breaks. Peaches and other of the softer fruits are soft fleshed and juicy when ripe in most cases. The pit of these fruits is hard and dark in color. If it is a free-stone variety, the mesocarp parts from the endocarp easily.

Grading and packing also are closely related to fruit diseases. Some fruits can be graded and packed in the field. This is the common practice with berries and grapes. Such a practice eliminates one handling and this is an important consideration in disease control. On the other hand there are fruits that must be transferred to the packing house to be graded and packed.

It is not practicable for the average grower to pick his fruit during the cooler portion of the day. If it is possible, it is desirable. But fruit that is picked throughout the day should be protected from the sun and heat and moved to storage as soon as possible. To illustrate the desirability of moving perishable fruits to a cool place an investigation was conducted with strawberries. Much of the strawberry loss is due to a fungus organism. The fruits that were attacked collapsed and lost the juice. The growth of the fungus depends upon the temperature at which the berries were held. This investigation showed that this particular decay could be held in check almost completely by maintaining a temperature of 40 to 50 degrees Fahrenheit if the berries are cooled completely and immediately.

The retarding effect of low temperatures on plant activities is a matter of general knowledge, and this principle has an application in the storage of fruit. The better preservation of the fruit at low temperatures is due both to a slowing of the plant activities of the fruit itself and to the checking of fungus and bacterial growth.

STORAGE IN RELATION TO DISEASES—In order to store fruit to the best advantage, certain requirements must be met. (1) Good fruit is essential. (2) The fruit must be properly handled. (3) Temperature must be controlled. (4) The proper degree of humidity must be maintained.

It is taken for granted that the fruit is of the best grades for the market. This paper has outlined what constitutes proper handling, but before going any farther, something must be said about requirements that must be met by good packages. Among the requirements of packages, those that have special relation to fruit diseases are the following: (1) Packages should furnish protection against the physical damage of the contents. (2)

They should provide for or facilitate the rapid ventilation of the goods. (3) Packages should keep the products clean.

A package, in order to meet the first requirement, must be substantially constructed yet light in weight and convenient to handle. A heavy package increases the freight rate too much in proportion to the value of the contents.

Over-sized packages are not only undesirable purely from the consumer's standpoint, but also from the standpoint of the producer and storage concern. A large bulk of perishable products requires more time to cool than a small bulk and the importance of rapid cooling has been pointed out. For that reason, boxes or crates are more desirable than the barrel.

It is quite a problem to construct an open package and yet have it one that will keep the products clean. To overcome this it is a common practice to line the crates with paper or wrap each individual fruit with paper. Most of the larger and more perishable fruits, as the citrus fruits, apples, pears, and peaches, are wrapped individually and placed in the package. Other fruits as the plums and prunes, apricots and berries are packed in small baskets and each basket is lined.

OILED apple wraps have been found to retard the life processes quite noticeably. As the study of oiled wraps progresses, the importance of a paper wrap is emphasized. One of the important functions of the fruit wrapper is to retard the life processes as much as possible and thereby increase the length of time which fruit may be kept.

Another function of paper wrappers is to prevent the transfer of fungii from one fruit to another. If the fungus is one that is capable of growing in storage temperatures, it is not likely that the wrapper will stop its development. But when the spores develop, they are confined in the wrapper and their dissemination is difficult or impossible.

All fruits are living organisms. The life cycle begins with the blossom and ends with the decay of the fruit. Picking the fruits does not stop the life cycle. At ordinary temperatures the processes advance more rapidly than ever and these may be retarded by low temperatures. In general, the quicker the cooling and the lower the temperature at which the fruit is stored, provided it is not below freezing, the more effectively are the life processes retarded and the longer the period which the fruit can be kept in good, sound condition. Prompt cooling is therefore necessary in order to retard the ripening processes that result in death decay.

Not only does quick cooling retard the ripening processes, but it tends to prevent the germination of fungus spores and to retard the development of fungus organ-

isms which attack and cause the decay of fruit in storage. In addition, it tends to prevent the development of skin blemishes as scald, soft scald and Jonathan spot.

The temperature must be low and it must not fluctuate. For apples, the most efficient storage temperature is about 31 to 32 degrees Fahrenheit. Unless a good continuous air circulation is assured in the storage room, 31 degrees should be considered the minimum. The danger from pockets of cold air near the floor, the refrigeration pipes or the cold air ducts renders it inadvisable to allow the temperature to drop below 31 degrees, unless a good circulation is assured.

Ice scald seems to be an injury due to insufficient oxygen and an accumulation of carbon dioxide within the paper wrappers in which peaches are often shipped. With good ventilation in conjunction with good refrigeration, such injury may be greatly reduced. This applies to the fruits in storage as well as those in transit and emphasizes the need of proper temperature, good ventilation and the correct humidity.

The humidity refers to the amount of moisture in the air. It is measured in grams per cubic foot of space. Fully saturated air is said to contain 100 per cent humidity. Most fruits have a water content varying from 80 to 84 per cent. If the atmosphere humidity exceeds the moisture content of the fruit in the storage, moisture collects on the surface of the fruit and forms drops. These constitute ideal conditions for the germination of decay organisms.

TRANSPORTATION IN RELATION TO DISEASES—Packing of infected produce, infection within the car and bruising and rough handling, and breaking down of the natural resistance due to car conditions are all causes of decay in shipment. Fruit decay in shipment is due to the activity of fungii and bacteria. These organisms are of two kinds, viz: (1) The organisms which have not the power of penetrating the sound unbroken skin of fruits, but depend entirely upon injuries or mechanical abrasions for entrance and (2) fungii and bacteria that have the power of attacking the fruit either on or off the tree. The brown rot of cherries is of the second class and the molds are of the first class.

Infection in the car is the result of conditions there present. Due to car conditions, period on the road or the age of the plant when it is shipped, the resistance of the host suddenly breaks down and the car becomes a mass of rotten produce. The problem of keeping fruit so it will put off the condition of inherent decay is more than a problem of refrigeration. The presence of any rotting vegetation in the car has its effect on the

(Continued on page 18)

Ousting the Prune Root Borer

By FRANK H. LATHROP

Oregon Agricultural College Experiment Station, Corvallis

OUR growers need no introduction to the prune root borer; they are well acquainted with this unwelcome guest of their peach and prune orchards. The full extent of the losses resulting from the root borer injury is difficult to estimate, but this is without doubt the most serious insect pest with which the Oregon prune grower has to contend.

The root borer tunnels under the bark of the tree, usually below the soil surface, where it may do great damage before the grower is aware that his trees have been attacked. The presence of the pest is usually first called to the attention of the grower by the masses of gum and frass exuding from the bases of the infested trees. Examination of an infested tree will show one or more tunnels just beneath the bark at the crown of the tree. If the examination is made in late summer or during the winter or early spring months the white grub-like larvae will be found in the tunnels.

As a result of a combined attack of several larvae the tree may be completely girdled and killed. More often the tree is not killed outright, the attack resulting in a diminished vitality and a reduced yield of fruit. It is the cumulative effect of continual infestation which proves most destructive to the trees. New tunnels are formed before the old ones heal, and large areas of the bark and cambium at the crown of the tree are killed. Fungus rots gain entrance here and the tree is doomed.

Besides prune, the root borer is found to attack a number of other stone fruits.

If we are not much mistaken many orchardist readers are going to register deep appreciation for the practical and concise manner in which Mr. Lathrop here sets forth the methods found most effective in combating the prune root borer. The appreciation will doubtless extend also to the institution which has made possible the tests he reports. At this time, when growers have taken new hope from results achieved with the paradichlorobenzene treatment for this pest, it is highly important that they be well informed as to the treatment's limitations. Mr. Lathrop ably points these out. Fortunately, he goes further and outlines alternative methods which are so effective as to merit trial under many conditions.

The pest seems to prefer almond. Others in order of susceptibility are: peach, apricot, prune and cherry. There have been reports that prunes grafted on Myrobalan plum stock are practically immune to attack. In our work we have found no evidence to support this claim.

LIFE HISTORY OF BORER—The winter is spent in the larval or grub stage. These worms seem to be active during warm periods, and more or less injury to the tree occurs during the winter months.

With the approach of spring the larvae become more active. The oldest borers soon leave their tunnels and spin cocoons of silk and frass.

The adult which emerges from the cocoons are very dark, steel-blue moths. The adults are active by day and have much the appearance of dark-colored wasps as they fly rapidly back and forth through the orchard. Moths first appear during the latter half of June. In Western Oregon the great number of moths appear during July, but they continue to emerge and deposit eggs throughout the summer.

The females begin depositing eggs about July 1. The period of heaviest egg laying occurs during the middle of July, however eggs continue to be deposited throughout the summer months.

Because of this long period of egg laying, larvae of all sizes may be found within the tree at almost any season. This gives the impression that there are several generations of the pest during

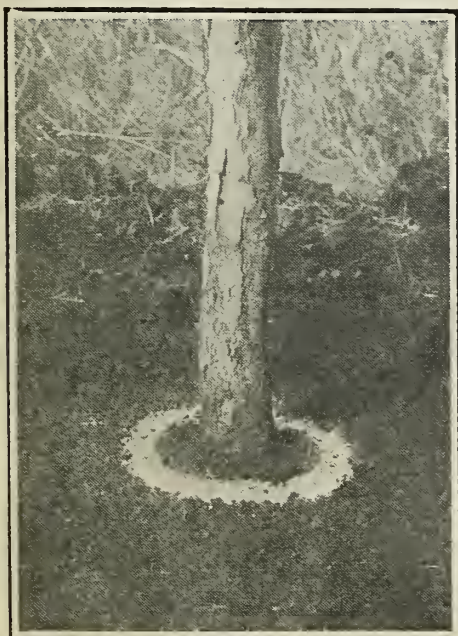
the season. As a matter of fact there is but a single generation.

CONTROL MEASURES—Because of the serious nature of this pest the Oregon Experiment Station has for several years made an intensive study of methods for its control. New recommendations have been made from time to time as new discoveries have developed. Growers are therefore keenly interested in the latest methods for the control of the root borer.

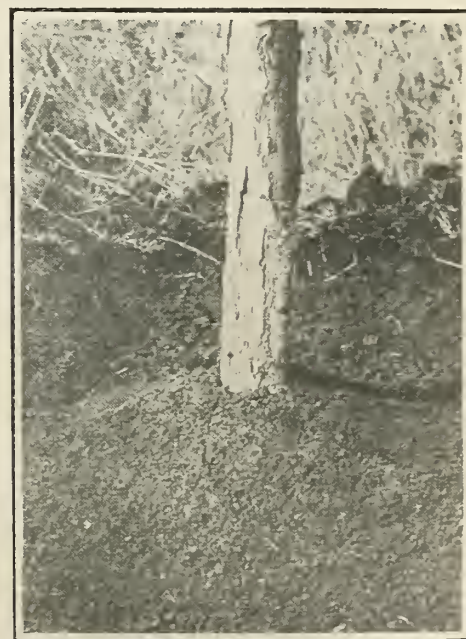
PARADICHLOROBENZENE TREATMENT—The remarkable success which has resulted from the use of paradichlorobenzene against peach tree borer in the east has attracted much attention among Oregon prune growers. "What are the possibilities of this treatment in Oregon?" they ask.

The Oregon Experiment Station is working on this problem, and we can now point out certain advantages in the use of this material and certain limitations which must be overcome to make this treatment thoroughly reliable for use in this section. Paradichlorobenzene is a crystalline solid which more or less rapidly changes into a gas if exposed to the air when the temperature is sufficiently high. The gas which is thus produced is poisonous to insects, and it is this gas which acts upon the root borers.

If the treatment is to be effective the soil temperature must be 55 degrees F. or higher for a period of ten days or more after the material is applied, and the soil must be reasonably dry during this time.



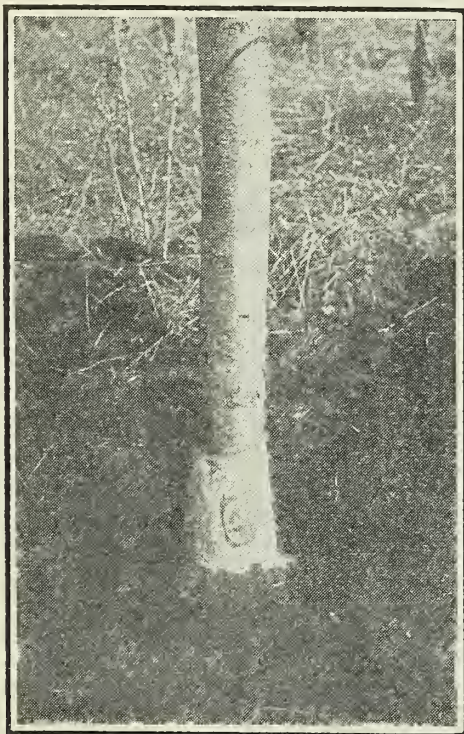
Prune tree with ring of paradichlorobenzene in place.



Application of paradichlorobenzene completed by mounding earth over the chemical.

PARADICHLOROBENZENE should be applied during very late summer or early fall, when there are comparatively few moths present to lay eggs, and while the weather is still warm and the soil dry.

The application of paradichlorobenzene will kill only those borers situated below the soil level. The western prune



Paper Collar in place about base of tree as recommended.

root borer has a strong tendency to work high up on the trunks of the trees, and even in the crotches of the larger limbs. Where this type of infestation is prevalent, the paradichlorobenzene treatment is, of course, not effective.

If proper caution is not used in applying the paradichlorobenzene, injury is likely to result to the trees, and at present this material is not considered safe for use on trees less than six years of age.

For the above reasons the Experiment Station does not consider the reliability of this treatment under Oregon and Washington conditions sufficiently proven as yet to warrant its general use in our orchards. At present many growers desire to test this treatment for themselves in their own orchards. The Experiment Station considers such tests desirable provided small plots are used, and the growers realize that the method is as yet largely experimental.

HOW TO APPLY PARADICHLOROBENZENE—Level off the surface of the soil about the base of the tree, but avoid disturbing the soil below the surface. If very large masses of gum are present at the base of the tree it is well to remove them before the treatment is applied. Having prepared the soil, proceed to sprinkle the finely ground paradichlorobenzene in a ring about the base of the tree. This should form a circle one inch wide and about two inches distant from

the tree trunk. This part of the treatment should be carefully done. If the material is placed too far from the base of the tree the effectiveness of the treatment is greatly lessened, while if it is placed too near the tree injury is likely to result.

As soon as the paradichlorobenzene has been properly distributed about the tree, it should be carefully covered with a few shovels of loose earth, and the mound so formed should be well packed over the material.

If weather conditions are favorable, the paradichlorobenzene immediately begins forming a gas which sinks downward through the soil, attacking the borers which are within the tree below the level of application. The material requires from ten days to several weeks to change completely into the gaseous state, and during this time the soil about the tree should not be disturbed. A period of low temperature or rain following the application very materially lowers the effectiveness of the treatment, and may cause injury to the trees.

AMOUNT AND TIME OF APPLICATION—From three-fourths to one ounce of the paradichlorobenzene is sufficient for an ordinary tree six years of age or older. It is not considered advisable to apply the material to younger trees.

The most satisfactory time to make the application of paradichlorobenzene in the Willamette Valley is from August 14 to 20. It is desirable to delay the treatment as late in the fall as practical in order to avoid reinfestation from moths which may be flying, and to allow the worms to collect about the crown of the tree as much as possible. However, sufficient time must be allowed for the treatment to act before September 1, for proper weather conditions can scarcely be depended upon in this section after that time.

NAPHTHALENE WHITEWASH TREATMENT—Owing to the uncertain status of the paradichlorobenzene treatment under conditions found here, many growers prefer to use some other method. The naphthalene whitewash treatment, properly applied, has given excellent results in our extensive experimental tests and good reports come from commercial growers who have used the treatment.

The following formula has given favorable results. The amounts as given are sufficient for about fifteen trees from four to six inches in diameter. The formula:

Quicklime	8 lb.
Glue or casein.....	1/2 lb.
Copper sulfate	1/4 lb.
Flake naphthalene	1 lb.
Water to form a thick paint	

Slake the quicklime in a suitable box or tub. The copper sulfate is valuable as a fungicide, but has little or no effect on the borers. It should be dissolved in

water a day or two before the wash is prepared, and should be added to the wash while the lime is slaking.

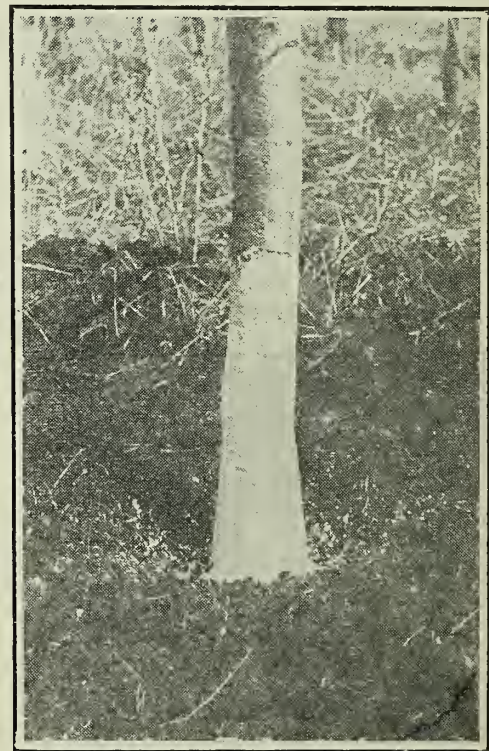
After the lime has become cool add the glue or casein. The purpose of this material is, of course, to increase the sticking properties of the wash. If glue is used a good grade of flake or granulated glue should be obtained. This should be dissolved in hot water or else soaked in water over night. Adding the glue while the lime is still warm helps in getting the glue in solution.

If casein is used a good grade of granular material (about 24 mesh) should be procured. This should not be added until after the lime is cool, and should be added slowly while the wash is being thoroughly stirred.

Now add the naphthalene. This is the material which kills the borers. It should be passed through a wire screen to break up any large lumps which may be present. This should not be added until the wash has become quite cool.

While the wash is being prepared water should be added sparingly from time to time until the mixture has the consistency of a thick paint. The proper consistency is important in obtaining a coating of desirable thickness on the trees. The wash should be stirred from time to time while it is being applied to the trees.

APPLYING THE WASH—Preparatory to applying the wash, the soil should be removed from the bases of the trees to



Naphthalene wash has been applied to tree-trunk and paper collar.

the depth of three or four inches. The adhering dust or soil particles should be brushed from the trunks where the wash is to be applied.

A collar of heavy, unglazed paper (several thicknesses of old newspaper will
(Continued on page 23)

Factors of Dehydrater Efficiency

By W. V. CRUESS and A. W. CHRISTIE
University of California Agricultural Experiment Station, Berkeley

FOR THE AVERAGE fruit grower who would operate during not more than two or three months of the year, the initial investment in a dehydrater should be kept as low as is compatible with efficiency. This is necessary particularly in cases where the dehydrater is to be used for only one variety of fruit. If the plant is to be used only as insurance against rain damage, as low cost of construction as is compatible with efficiency is essential.

It has been demonstrated that a thoroughly satisfactory fruit dehydrater can be built at a cost not exceeding \$500 per green ton capacity per 24 hours. This includes cost of trays, cars, and all equipment used in the dehydrater proper, but not dipping and packing equipment. A less expensive, but also less efficient dehydrater is often sufficient for insurance against rain damage.

The costs reported in Table I are based upon the capacity for a sixty-day season and represent fixed charges for each green ton and each dry ton of fruit, respectively handled during the sixty-day period. A depreciation of 10 per cent is assumed for all plants, although it varies greatly with the type of construction.

It is evident from Table I that most of the dehydraters listed represent too large an investment for the tonnage of fruit dried. If the plants were operated throughout the year, the relative fixed charges would be much less. Under such conditions, a high initial investment might be economically sound.

COST OF OPERATION—The amount of labor, fuel, power and materials used in the operation of the University Farm dehydrater was carefully determined and similar data were obtained for several commercial plants of various designs and

capacities. From these data, the cost was calculated by assuming prices of 6 cents per gallon for fuel oil, 2½ cents per kilowatt hour for power, and 50 cents per hour for labor. Table II summarizes the results of these calculations.

TABLE II COMPARATIVE COSTS OF DEHYDRATION			
Plant No.	Type	Fruit	Cost per Ton
D	Direct heat, air-blast tunnel	Prunes	\$ 6.68
B	Univ. Farm, Santa Clara.....	Prunes	8.51
E	University Farm, Davis.....	Grapes	8.98
H	Air-blast cabinet.....	Prunes	11.34
J	Air-blast tunnel.....	Prunes	13.05

These data and calculations, which are supported by less complete data obtained for several plants not included in Table II, lead to the conclusion that the type of dehydrater consisting of a tunnel through which the fruit is progressively moved on trucks and dried in a blast of re-circulated air is the most efficient of those now in use in California.

“Direct heat” dehydraters in all instances gave high fuel efficiency. This was to be expected because in this type of dehydrater, stack losses are eliminated.

In general, it was possible to obtain higher fuel efficiency in the dehydration of free drying fruits, such as apples and apricots, than of fruits which case-harden, such as pears and prunes. By “case-hardening” is meant the dessication or overdrying of the surface of fruits, which makes them almost impervious to the escape of moisture from within and thereby greatly lengthens the drying time. If the humidity and the re-circulation of the air were under perfect control, differences in fuel efficiency for different

fruits would be lessened.

FUNCTIONS OF THE AIR—Air serves two purposes in the dehydration of fruits. It conveys to the fruit the heat necessary to evaporate the surplus moisture and it carries away the water vapor after evaporation has taken place. Much more air is required for the former than for the latter function.

To evaporate one pound of water at the average temperature used in dehydrating fruit requires the heat furnished by 1750 cubic feet of air dropping 40 degrees F., but one pound of water vapor will saturate only 235 cubic feet of air at 110 degrees F. For example, if dry air enters the drying chamber at 150 degrees F. and leaves it saturated with water at 110 degrees F., 235 cubic feet will carry away one pound of water. But under these conditions with a 40-degree temperature drop, 1750 cubic feet is necessary to evaporate one pound of water, or more than seven times as much as that required to carry away the evaporating moisture. The ratio will be less than 7:1 unless the entering air is perfectly dry, or the escaping air completely saturated with moisture. For example, if the entering air is 10 per cent saturated with moisture vapor at 150 degrees F., and the exhaust air is at 110 degrees F. and saturated with moisture vapor, 335 instead of 235 cubic feet will be required to absorb one pound of water vapor from the fruit.

Again, if the entering air at 150 degrees F. is 10 per cent saturated and the exhaust air at 110 F. is only 75 per cent saturated with moisture, 522 cubic feet of air will be required to remove one pound of water vapor from the fruit; the ratio between the amount of air required to furnish heat and that necessary to remove the water vapor becoming 3.35:1. For simplicity the above calculations disregard the slight differences in the volume of air caused by changes in temperature.

Knowing the tons of green fruit per charge, the drying ratio of the fruit and the estimated drying time, it is possible to calculate the minimum air-flow requirement for a dehydrater. For example, if a dehydrater is to hold ten tons of prunes with a drying ratio of 2½:1, and is to dry the fruit in 24 hours, it will be necessary to remove 12,000 pounds of water per 24 hours or 8.3 pounds per minute. If the temperature drop is 40 degrees F., there will be required 8.3×1750 or 14,525 cubic feet of air per minute. If various heat losses are included, the designer should allow at least 20,000 cubic feet of air per minute for a dehydrater of this size.

TABLE I
COST OF DEHYDRATION AS AFFECTED BY PLANT INVESTMENT

Plant No.	Type of Plant	Capacity Green Tons per 24 hours	Total First Cost of Plant	Cost of Plant per green ton 24 hours	Fixed Charges per Ton basis of 60-day season*					Total per Dry Ton
					Inter-est	De-precia-tion	In-sur-ance	Taxes	Total	
A	Air-blast tunnel, direct heat.....	25	\$12,000	\$ 480	\$.56	\$.80	\$.10	\$.24	\$1.70	\$ 5.10
B	University Farm type, Santa Clara County.....	8.6	5,000	581	.67	.97	.12	.26	1.92	5.76
C	Air-blast tunnel, direct heat.....	24	14,000	583	.68	.98	.12	.26	1.94	5.82
D	Air-blast tunnel, direct heat.....	52	36,000	596	.69	.99	.12	.27	2.07	6.21
E	University Farm type, Davis.....	6	4,000	667	.78	1.11	.14	.29	2.32	6.96
F	Air-blast tunnel, direct heat.....	35	25,000	715	.83	1.19	.15	.32	2.49	7.47
G	Air-blast tunnel, direct heat.....	5	5,500	1,100	1.28	1.83	.23	.48	3.82	11.46
H	Air-blast cabinet.....	12	15,000	1,250	1.46	2.09	.26	.55	4.36	13.08
I	Small Oregon, tunnel type.....	.75	1,000	1,330	1.55	2.20	.28	.59	4.62	13.86
J	Air-blast tunnel.....	20	25,000	1,250	1.46	2.08	.26	.67	4.47	13.41
K	Small stack type.....	.75	1,500	2,000	2.33	3.55	.42	.89	7.19	21.57
L	Air-blast stack type.....	1.50	4,000	2,666	3.11	4.44	.55	1.48	9.28	27.84

*Interest at 7 per cent; depreciation at 10 per cent; insurance at 2½ per cent of half value; taxes at 4 per cent of two-thirds value.

THE importance of adequate air flow cannot be over-emphasized. More dehydrators have failed because of insufficient air supply than for all other reasons combined. It must be realized that at least five times as much air is usually necessary to furnish heat for drying as is required for the removal of the evaporated moisture.

Most of the dehydrators tested were operated at temperatures of 165 degrees F. to 185 degrees F. at the "finishing point." The best quality with most fruits is most readily attained by finishing at temperatures not in excess of 150 degrees F., but with the same volume of air per unit of drying surface drying is less rapid than at 165 degrees F. Within certain limits, the same rate of drying at lower temperatures can be maintained by increasing the volume of air. Owing to the facts that horsepower increases very rapidly with increase in air velocity and that a certain minimum time is required for any fruit to give up its moisture to the surrounding air, increase of air velocity beyond a certain maximum becomes uneconomical. Although this maximum will vary greatly with the variety of fruit and its preliminary treatment, the maximum efficient velocity for most products would probably not exceed 1100 feet per minute.

Taking all factors into consideration, economical drying can best be obtained by a velocity of not less than 500 feet per minute for fruits which case-harden, and a velocity of at least 750 feet per minute for freely drying fruits. In the drying of grapes, sliced apples, and other freely drying substances, it is probable that velocities of 800 to 1000 feet per minute would sufficiently accelerate drying to compensate for the increased cost of power for the fan. Dehydrators depending to a considerable extent upon direct radiation of heat require less air than air-blast dehydrators to accomplish the same amount of drying within the same time. Such dehydrators are, however, limited in their rate of drying by the amount of heat reaching the fruit by direct radiation and by the velocity of air flow which it is possible to obtain by natural draft.

Attempts to equip stack driers with fans have not proved satisfactory because their construction does not permit uniform air distribution. Our observations on the air flow in natural draft dehydrators are insufficient to base recommendation on regarding minimum air-flow requirements. However, natural-draft dehydrators even of the most approved design give a slower rate of drying, a less uniformly dried product, and a lower fuel efficiency than the best air-blast dehydrators. These advantages of the latter are obtained for a smaller initial plant investment, when the drying capacity is considered.

"PARALLEL CURRENT" SYSTEM—In most tunnel dehydrators the fresh fruit

enters at the air exhaust end and the dried fruit leaves at the air intake end of the drying compartment. During drying, the fruit is moved from air of moderate temperature (100 degrees F. to 120 degrees F.) at the start of drying to temperatures of 150 degrees F. to 190 degrees F. near the end of the drying period. This is termed the "counter current" system. During the first stages, very little drying occurs because of the moist condition and relatively low temperature of the air. The drying process is completed in air of high temperature and low relative humidity, conditions that favor case-hardening and scorching of the fruit.

In the so-called "parallel current system," the fruit enters at the air intake end of the drying compartment and is taken from the dehydrator at the air exhaust end. In other words, the drying process is started in hot, dry air and is completed in warm, moist air. For some fruits this system possesses the following advantages:

1. Evaporation of the surplus moisture is very rapid during the initial stages of the drying period when the fruit is moist and in the best condition to give up its water.

2. The wet fruit is more nearly at the temperature of the wet-bulb thermometer because the fruit contains sufficient moisture to maintain a rapid rate of evaporation which reduces its temperature proportionately. This permits higher drying temperatures than are now used, thus still further increasing the rate of drying. In the "counter current" system the fruit near the end of the drying process, because of its low moisture content and slow rate of drying, is very apt to approach the temperature of the hot, dry air and become scorched and caramelized. The "parallel current" system takes fuller advantage of the great drying power of air direct from the heating chamber.

3. The fruit gradually progresses during drying toward a region of lower temperature and higher humidity so that scorching and over-drying are avoided.

4. The fruit emerges after drying at a relatively low temperature so that much less heat is carried to the outside atmosphere by heated cars, trays, and fruit than is the case with the "counter current" system. The "parallel current" system therefore conserves heat.

A preliminary test of this method was made in a large commercial dehydrator. Two carloads of grapes which received the high initial temperature, dried so rapidly that it was necessary to remove them from the tunnel several hours before cars which had received a low initial temperature. Further tests on the "parallel current" system, as applied to apples and cherries have been conducted in the Fruit Products Laboratory and in commercial plants with favorable results.

SUMMARY AND CONCLUSIONS—1. The cost of a dehydrator erected by the average fruit grower for operation during a season of only one or two months must be as low as is compatible with reasonable efficiency if it is to be profitable.

2. A completely equipped and satisfactory dehydrator can be built for \$500 or less per green ton capacity per 24 hours.

3. The air-blast tunnel type of dehydrator is the most economical to operate in regard to both fixed charges and operating costs.

4. For efficiency, the velocity of air across trays should not fall below 500 feet per minute, while the total volume of air per 100 square feet of tray surface should not be less than 250 cubic feet per minute.

5. In order to reduce static pressure and secure maximum fan capacity, all air passages should be as large in area, as short in length, and as direct as possible.

6. Inefficiency will result unless all the heated air flows *between* the trays of drying fruit and is equally distributed among the several trays. This can be accomplished readily by proper relative dimensions of the drying chamber and trays, supplemented by the intelligent use of baffles and dampers.

7. Multivane or steel-plate fans, although more costly, more than repay their extra cost by their greater efficiency, especially in large dehydrators, where high static pressure must be overcome.

8. Fruits which are sulfured should be dried on wooden trays, preferably with slat bottoms. Unsulfured fruits are most rapidly dried on screen trays.

9. Air of 20 to 50 per cent relative humidity is advantageous in the dehydration of fruits which case-harden readily. Such moist air permits the steady exaporation of moisture from the fruit at relatively high temperatures.

10. Prunes and grapes are most rapidly dried if previously dipped in a boiling lye solution. The first requisite of any dipper is a source of heat sufficient to maintain the lye solution boiling constantly during operation.

Maggots Destroy Canes

Cutting out and destroying infected canes is the only means yet known for combating the destructive cane maggot that is causing considerable damage in raspberry and loganberry fields. New tender shoots of these plants are frequently found with their tops blighted and drooping in a characteristic "limberneck" fashion. A closer examination of the injured cane reveals a bluish girdle just under the bark at the base of the blighted tip. Cutting into the interior will often show the culprit—a small whitish maggot within the pith.

Prune Industry in Washington

By PAUL H. WEYRAUCH
Walla Walla, Washington

EIGHT years ago I read a paper on prune culture and my concluding statement at that time was, "There is every reason to believe that the careful, painstaking prune grower will be able to hold his own with the grower of any other fruit."

Those who have been interested in the industry since well know that this prediction was a correct one. The orchards which I managed at that time have long since been sold to private holders and where the Blalock Fruit Company at one time owned hundreds of acres of prunes these same orchards are now owned by hundreds of small growers practically all of whom have made a decided success in the industry.

It is always interesting to know something about the history of the industry in which you are engaged. Prunes were grown in Europe a thousand years ago. They were introduced into France by the Benedictines. The first trees were planted at Abbey Clairac, located on the River Lot. Conditions at this particular place were very favorable and the monks were very successful in the growing of prunes. During my service in France during the recent war I investigated the orchard industry and particularly the prune industry wherever I could, and found a number of very old orchards in the divers places which I had an opportunity to visit. In many places these orchards were very poorly kept, due in part to the fact that practically the entire manhood of the country had either been disabled or was at the front, and partly to the fact that modern care of orchards is not known.

France, however, supplied the first cuttings which were procured by Pierre of Louis Pellier, who planted a prune nursery on the banks of the Garonne in 1856 or 1857. These cuttings were introduced into the United States in the Ville Neuve vineyard near Portland. The first California prune orchard was planted by Etienne d'Agén, after the method which the cuttings were

by Miller is said to have planted the first prune trees in the Willamette valley near Milwaukie, Oregon, in 1856. Caldwell bears the reputation of having planted the first commercial prune orchard near Portland. The wonderful development of the prune industry in Southeastern Washington is due to Dr. N. G. Blalock, who planted 100 acres to prunes in 1882. He was scoffed and sneered upon as a visionary, but has since been proven of wonderful

This paper presents not only the history of the prune and the development of prune growing in Washington state, but includes a lot of information about planting, growing and marketing of the fruit. All phases of the industry, including cultivation, irrigation, harvesting and packing are given attention. The paper was presented before the annual meeting of the Washington State Horticulture Association by Colonel Weyrauch, but is of such value as to deserve the wider circulation we gladly give it here.

benefit to those now engaged in the industry.

Dr. Blalock, in order to secure sufficient stock, had to go back east as far as Missouri and Kansas, but soon increased his orchard from ten to forty acres. His example was followed by many others and within a comparatively short time a number of prune orchards had been planted. The question was how to market the output of the orchards. Owing to the comparatively small population in the Northwest it was readily seen that the crop produced could not be disposed of without being dried, and driers were established. The dried product at that time was sold at prices from eight to twelve cents per pound. This meant anywhere from forty to fifty dollars per ton for the green prunes which, of course, was a very good price.

The bearing orchards increased rapidly and prices consequently declined. A number of orchardists became discouraged and dug up their prune trees. Some of them however, persevered and increased their holdings instead. Dr. Blalock was among them. Those who are at all familiar with the industry today know that it is a very profitable one.

The most important factor in the building of a prune orchard is, of course, the selection of the stock and the planting. The soil should be prepared by deep plowing and should be pulverized. The trees used in the Walla Walla valley are nearly all budded on peach roots. The Myrobalan root is in common use in California. In the older orchards the trees were planted 16 x 16 feet apart, but this does not give sufficient space and the trees soon crowd one another. Not less than 18 feet should be left between trees. The planting board is used for planting. The soil is well worked in between the

roots and care is taken that the position of the root is as natural as possible. The prevailing wind should be considered and the trees planted accordingly. The soil should be forced in between the roots by hand. More soil must then be added, tramped in by foot, and the planting is finished by throwing loose soil on top, which serves as a mulch. Planting in the Walla Walla valley can well be done in the fall, in which case the heading back is done in the spring. For planting, of course, the roots are carefully examined and the ends cut off with a sharp knife.

PRUNING—Some prune growers are very careless about pruning their trees. It is just as important to prune a prune orchard properly as it is any other orchard. The amount of pruning done depends upon the growth, which is of course influenced by soil conditions. Every orchard has its own problems. A well proportioned tree which will be strong enough to bear a heavy load can only be obtained by proper pruning. Water sprouts should be removed and the energy preserved that would otherwise be wasted.

Pruning in our locality can well be done during the winter months. Implements used are a pair of shears with handles about 22 inches long, a medium sized pruning saw, and long handled pruning shears with handles 8 or 10 feet long. Tools, it is unnecessary to say, should be kept in good condition so as to avoid ragged cuts. Larger cuts should be promptly painted over with white lead or a similar preparation. Young trees when planted in the fall should be headed back during the following spring to about 20 inches. The tree can be moulded at the end of the first year.

We consider it best to leave about four limbs and train these so that the center is open for air and sunshine. The prune tree spreads very easily and for that reason pruning must be carried out to bring about a more upright growth. A stocky vigorous tree is preferable to a tall, spreading one.

A great deal more might be said about pruning, but after all, this is an individual problem and only general rules can be laid down.

CULTIVATION—Years ago we were convinced that clean cultivation was the best method to pursue and even until recent years some of our growers have preferred and continued that method. Evidence, however, is abundant to show that orchards growing a cover crop, such as alfalfa, or clover, yield better than

orchards that are clean cultivated. Our soils are heavily stored with mineral foods, but they do not ordinarily contain sufficient humus for the development of our trees. If enough barnyard manure could be obtained for use in these orchards the problem might be solved, but even that is not considered as good as a cover crop. It does not go down sufficiently deep for the roots of our trees.

A cover crop, however, such as alfalfa or clover will fill our soil with suitable plant food, to the proper depth. In order to get the best results from cover crops they should be plowed under occasionally. Alfalfa seems to have given the best results thus far. We found this to be the case eight or nine years ago and it has again been proven in recent years, to be the best practice.

Nearly all the orchards in Eastern Washington are irrigated; some of them by artesian wells. The first irrigation is generally applied late in the spring. The second is in June, and the third begins about the first of August. The time of irrigating, of course, depends on weather conditions, but three irrigations are given as a general rule.

DISEASES—The disease and insect pests to which the prune trees are subject are few and easily controlled. The principal one is San Jose scale. We are also troubled at times with red spider and green aphid. San Jose scale is well known and the remedy used is a lime and sulfur spray, 28 degrees Baume, diluted at the rate of one gallon to seven gallons of water. A power spray outfit is used for the application of this mixture. Oil emulsion has been used but practically all our growers have returned to the lime and sulfur spray as the most efficient. There is practically no San Jose scale in the Walla Walla valley today.

In most orchards spraying is done from the ground, but in a few a tower is used. Seven or eight years ago the Blalock orchards were affected with what is known as "crown gall," "root knot," or "crown knot." This disease was last treated in the years 1913 and 1914. Our orchards have not been troubled with that disease since that time. Some few of our orchards have suffered seriously from red spider and there has been some damage from green aphid.

HARVESTING AND PACKING—The crop is generally harvested during the month of August commencing generally about the middle of the month. The harvesting sometimes continues for more than a month, depending upon crop conditions and weather conditions. Many of our orchards yield as high as fifteen tons to the acre. The average yield may be set at ten tons per acre.

Picking is done by piece work and great care is exercised to see that the stem is left on the fruit, that the fruit is not bruised and that the blush is left on the

prune. The fruit is carried to the various packing houses as rapidly as possible so as to get it out of the sun, and prunes are packed just as promptly as they can be disposed of by the packers.

Prunes are packed in various containers, the best known of these being the tin top pack. The crate we use is the export prune crate 16x16x4 $\frac{1}{4}$. It contains four tin tops 6 $\frac{1}{4}$ at the bottom, 7 $\frac{3}{4}$ at the top and 4 in. high. The lumber used in the export crate is $\frac{3}{8}$ in. with the exception of the ends, which are $\frac{5}{8}$ in. The superior strength of this so-called export crate prevents its being easily broken, even with rough handling.

The prunes are packed in these tin tops according to size and the packs are known as 5x5, 5x6 and 6x6, according to the number of prunes in a layer. The peach box pack has been used for some years. Ordinarily a 3 $\frac{1}{4}$ in. peach box is used, which contains approximately 16 lbs. of prunes. No attempt is made to pack these prunes in layers, but they are generally dumped into the box and in many cases loose stems and leaves also find their way into this pack. Altogether the peach box pack is an inferior pack and its only excuse for existence is the fact that our crops must be harvested within a limited time and sufficient expert labor is not always available to pack prunes in tin tops.

The tin top pack is a very attractive pack providing the packing is done properly. The prunes are packed stems up in the two bottom layers and stems down in the top layers. There are still other packs, such as the faced and filled pack, which has been used with more or less success by various organizations. My own preference is the tin top pack, supplemented by the 3 $\frac{1}{4}$ in. peach box, where that is necessary to get the crop harvested in ample time.

DRYING is no longer resorted to in Eastern Washington, but this industry has grown to enormous proportions in Western Washington, particularly in Clark County. We have in years past dried prunes and we are still prepared to dry the product in case of necessity or emergency.

MARKETING—Washington prunes have found a ready market in every state in the United States as well as abroad. Prior to the European war a number of cars were shipped to English markets every year and even less than carload shipments were made from New York to the Panama Canal. Our principal markets are the middle states, Missouri, Kansas, Nebraska, where a great number of cars of prunes are consumed every year.

Prices in recent years have been very favorable. Beginning with the year 1916 prices have varied from \$50 to \$110 per ton, but with the lower purchasing power now existing it is doubtful if these prices can be maintained.

However, with wages and material correspondingly lower prune orchards will continue to yield a handsome profit, even at much lower prices.

The prune grower must be on the constant lookout for the proper maintenance and care of his orchard. Nothing must be left to chance. Proper cultivation, proper pruning and proper fertilization must be practiced. In many cases artificial fertilization must be resorted to. This is particularly true of older orchards. The growers must be on the lookout for diseases, which must be combated as they appear. Every orchard is its own problem, and it will yield returns only in proportion to the care given it. We cannot expect continually to reap a harvest without adequate return of plant food to the soil. The soil must be reimbursed in some way or other, otherwise it will become impoverished and a crop poor in quality and meager in quantity will be the result.

Prune growing has been one of the most profitable orchard industries district, and will continue to be, as long as growers strive intelligently to look after and care for their prune orchards.

International Shippers

FROM every customary standard the twenty-seventh annual convention of the International Apple Shippers' Association, held at Seattle, July 24-28, was entirely successful, fully justifying the anticipations with which it was voted to hold the conclave in the far northwest for the first time. Attendance was unusually good, enrollment of delegates and guests mounting to more than 1300. The hundreds of eastern delegates expressed themselves as highly pleased with the entertainment provided them in the convention city and the various fruit districts which most of them took opportunity to visit.

Officers elected for the ensuing year were: William Morse, Chicago, president; A. R. Currie, Seattle, vice-president; George W. Davison, New Orleans, treasurer; R. G. Phillips, Rochester, N. Y., secretary. E. T. Butterworth, retiring president, presided at the various business sessions.

Tuesday, the opening day, was given over to registration and to a reception in the evening at the Washington hotel, where convention headquarters were maintained. On Wednesday the opening session was held in the Moore theater, with addresses of welcome by Governor L. F. Hart of Washington and Mayor E. J. Brown of Seattle, and response by E. W. J. Hearty of Boston. A buffet luncheon was enjoyed and during the afternoon a trip of inspection about the Sound was made. In the evening the visitors were guests at presentation of the pageant, "The Wayfarer."

On Thursday there was another morning business session. The chief addresses were those of Dean Stephen Miller, University of Washington, on "Economic Distribution" and W. T. Clark of Wenatchee, on "How Apple Industry Became Possible in Washington." The afternoon was given over to committee sessions, with entertainment for the visiting women at the Arctic club. In the evening there was the annual banquet, held at the Masonic Temple, with Worrall Wilson as toastmaster.

Friday morning the final business session was held, followed by an executive session and election of officers. The ladies were taken on a drive during the afternoon and buffet luncheon was served them at the North club. Luncheon was served the delegates at the Bell Street dock through courtesy of the Northwest Merchants' convention. Saturday was also given over to golf and other amusements and recreations for the delegates remaining in Seattle.

On Monday, July 31, the greater number of eastern delegates were entertained in Portland, at lunch and then were driven over the Columbia River Highway. Dinner was enjoyed at the Columbia Gorge hotel, with Hood River and Mosier growers as the hosts. On Tuesday, August 1, the same hosts took the delegates to The Dalles and thence to White Salmon and Underwood, where arrangements for their entertainment concluded on Wednesday with a luncheon.

It is probably needless to add that, since the entire convention occurred after the usual time of closing our forms, BETTER FRUIT can give little more in this issue of the details than here summarized.

On the outward trip the delegates enjoyed the hospitality of Spokane, Wenatchee, Yakima and other northern fruit districts. They reported that everywhere they were accorded a fine reception, enjoyed a jolly good time and were highly pleased that the convention had come this year to the northwest.

Recent investigations show that pear thrips, a serious insect pest of pears, prunes, and cherries, have spread south from their former localized area in the central Willamette Valley. Thrips come out of the ground in the spring and attack the buds by feeding on the tender parts and puncturing the blossom stems in depositing their eggs. Nicotine spray after blossoming destroys most of the young thrips, but the best method of control is to use a miscible oil as a spray when the adults first emerge.

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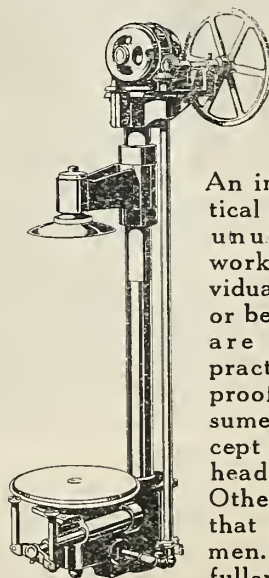
The Registrar,
Oregon Agricultural College
Corvallis, Oregon.



Pedigreed Silver and Cross FOXES for sale. Prices Reasonable. Write for information.
William D. Rambo
407 Sprague Ave.
Spokane Wash.

Kindly tell the advertiser you read his ad here.

Skinner Hydraulic Barrel Heading Press



An improved, practical press that does unusually good work. Run by individual motor drive, or belt drive. Valves are rotary type, practically wear-proof. Pump consumes no power except when pressing head into barrel. Other good points that appeal to busy men. Write us for fuller description.

Skinner Machinery Company

Third Street, Dunedin, Florida

Fruit and Honey Stamps, Cattle and Sheep Tags, Stencils, Etc.; Typewriters and Office Goods.

P. D. Cunningham Co.

231 Stark St., Portland, Oregon

Feeding of Strawberry Plants

By A. V. AMET

Field Expert, Tacoma, Washington

MANY thousand dollars worth of strawberries and by-products are grown and manufactured each year on the Pacific coast, with a demand that has always exceeded the supply where quality and berries in good condition are produced. But rather than increase the acreage each year as it is being done, increased yields per acre of better quality seem more in line with efficient farming. So the question of fertilizer is answered by the profits.

Experience has shown that the right use of fertilizers, barn manures, proper cultural methods, good healthy stock, and liming when necessary, bring highest

strawberry profits. It has been interesting to note in traveling over berry fields in the principal centers of production, namely: Puyallup Valley, Hood River, Santa Clara Valley, and Los Angeles, during the last eight years that yields of strawberries follow closely the attention the grower gives to the feeding of his crop. The highest yield observed in the experience of the writer was made by a grower at Lamanda Park, California, during the 1920 season. He produced slightly over twenty thousand dollars worth of Klondike berries on seven acres through the use of adequate and proper fertilizer.

With strawberries, correct fertilizing is far more important than the selection of the soil, for almost any soil will make fine berries if properly manured and fertilized. No soil can make them for any length of time without judicious and liberal applications of fertilizers.

Fertility and fertilizer are not synonymous. By fertility we mean the inherent power of the soil to produce the conditions that make its content of plant food available to the plant. We do not mean the total supply of plant food in the soil. The vital factors that create soil fertility are carbon, oxygen, hydrogen and nitrogen, with the co-operation of the light and warmth from the sun, and man's labor. These coordinated factors create reactions that render available the compounds of the soil composed of silica, alumina, lime, humus, and ashes.



Every "4 W" Picking Bucket Sold During the 1921 Season Paid for Itself Many Times Over by Eliminating Loss From Bruised and Stem-punctured Apples

Earned \$25 to \$50 Each
Wenatchee, Wash., Oct. 22, 1921

WELLS & WADE,
Wenatchee, Washington.

Gentlemen: During the 1921 fruit season we purchased and used approximately two hundred fifty of your "4W" Picking Buckets. The bucket has proven a big success in our orchards, practically eliminating stem punctures from our fruit. It would be very hard to induce this organization to go back to the old system of picking with canvas bags.

It is impossible to estimate the saving made by the use of the Wells & Wade Bucket—but I am confident that in our orchards we have been able to market several thousand more boxes of apples because of having used the buckets, than we would have marketed if we had used canvas picking bags.

Very truly yours,

AMERICAN FRUIT GROWERS, INC.

(Signed) By Earl Barnhill, Regional Supervisor.

Stop making CULLS
out of your Extra
Fancy Fruit

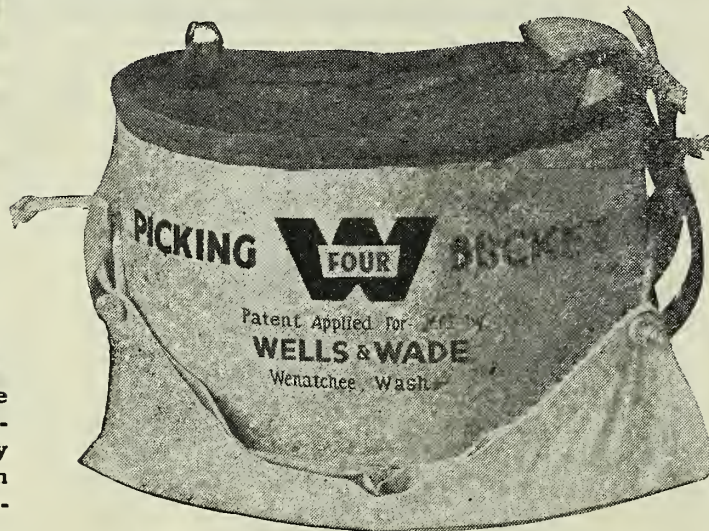
No Bruised Fruit

No Stem Punctures

The "4W" Picking Bucket

PATENT APPLIED FOR

A heavy, galvanized-iron picking bucket with bottom of strong canvas, reinforced at wearing points with chrome leather. Bucket is shaped to fit close to the body. Suspender-style harness distributes load equally on both shoulders and back. Top edge of bucket lower in front by one inch; and is padded with felt, covered with twill webbing sewed to bucket with soft brass wire. Felt pad at back stops bruising in picking operation. Canvas bottoms are fastened to bucket by patented ring which permits instant removal if ever necessary. Hundreds of these buckets will go through two full seasons without changing the original canvas. New bottoms are always available and inexpensive. Fruit is emptied from the bucket through canvas bottom—both hands of the picker guiding placement and assuring no damage to the finest fruit.



"Better Than Bags"

Pehastin, Wash., Oct. 21, 1921

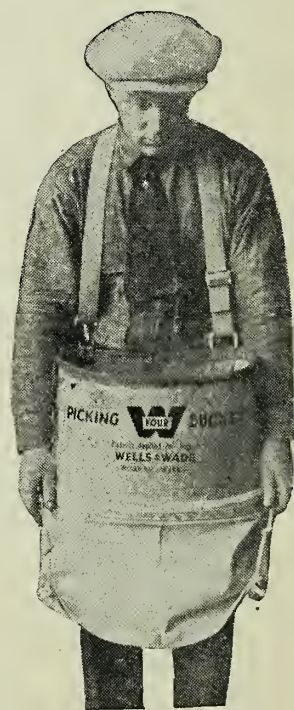
WELLS & WADE,
Wenatchee, Washington.

Gentlemen: There were 40,000 boxes of apples picked in "4W" Picking Buckets on this tract this season—and I can say that this bucket has given entire satisfaction. Growers who have used the "bags" in years past have found that at least 15 per cent of the fruit picked in bags have been "culls," from bruises and stem punctures. This is a HEAVY LOSS to any grower. After using the "4W" Picking Bucket a full season, I can safely say that I have not had 1 per cent loss in bruised or stem punctured apples—and this applies equally well to all varieties of tree fruit. Furthermore, I have not had a single apple picker want to change one of these buckets for a bag.

Yours very truly,

(Signed) CHARLES LINVILLE,

Manager Pehastin Orchard, Pehastin, Wash.



Price \$4.50

SEND FOR SAMPLE
BUCKET—NOW!—PLACE
ORDERS EARLY

Insure Delivery by
PLACING
ORDERS NOW!

WELLS & WADE

Manufacturers and Distributors

WENATCHEE, WASHINGTON

Expressed in more simple terms: air, water, warmth, light and active bacteria in the soil create plant life.

Fertilizer, as known to the fertilizer manufacturer and consumer, is made up of materials containing nitrogen, phosphoric acid, and potash, and when the fertilizer contains a quantity of one per cent or more of each of these three elements it is called a complete fertilizer. There are three forms of nitrogen, as shown by chemical analysis, which are used in complete fertilizers: the nitric nitrogen, ammoniacal nitrogen, and organic nitrogen. The nitric nitrogen is soluble and immediately available to plant life. Ammoniacal nitrogen is converted into nitric nitrogen by action of bacteria and soil chemicals in rather a short period, and this form is taken up by the berry plant that is fertilized. Organic nitrogen is slower than either of the other two forms to become available, for, in its decomposition, it must change to the ammoniacal form and then to the nitric form of nitrogen.

There are three forms of phosphoric acid: water soluble, citrate soluble, and insoluble. In the use of the three forms of nitrogen and three forms of phosphoric acid there is a continuing availability of plant food throughout the growing season.

Potash is all water soluble, the two standard forms being muriate of potash and sulphate of potash, with practically the same agricultural value.

Fertilizer may assist in creating fertility, yet the improper use of it might bring about infertile soil conditions. Fertilizer suitable to any particular soil, applied at the proper time and in the right manner, should assist in creating fertility, but its main purpose is not to render fertility, but to increase production and improve the quality.

The strawberry is an aggregation of innumerable seeds gathered into a cluster or pulp which is composed chiefly of water and sugar. Nevertheless, a good deal of nourishment is required to produce the root and leaf growth and small seeds essential to fruiting. It has been estimated by conservative investigators that two good crops of berries including the production of vine and fruit will remove during the three years of growth of the crop at least two hundred and twenty-three pounds or more of nitrogen, eighty-three pounds or more of phosphoric acid, and three hundred and seventy-five pounds or more of potash per acre.

NOW, the amount of a given plant food removed by a crop does not reveal the exact amount to apply in a fertilizer for a certain desired yield, as supplied than 83 or more pounds that is contained in the crop. In fact, more
(Continued on page 33)



FRUIT LABELS

Write today for
Samples and Prices
We welcome large
or small orders

The United States Printing
and Lithograph Company
Color Printing Headquarters

Seattle

San Francisco

H. S. Galligan, Prop. Established 1900

True-to-Name Nursery

offers a complete line of fruit trees including Anjou, Bosc and Bartlett Pear, Delicious, Ortley and Red Gravenstein Apple and other leading varieties of Pear, Apple, Cherry, Peach, Apricot, etc. Our trees are grown mostly from buds, selected from our own bearing orchards and all guaranteed true-to-name. If interested, write us. True-to-Name Nursery, Hood River, Oregon.

Rubber Stamps for Fruit Boxes

Write for Sample and Prices to

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Wanted To Buy

Pear, Peach, Plum, Apricot trees, Berry plants, Argentieul Asparagus Roots. Will buy in large lots. Give kind, amount, price, etc.

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Brawley, California

TREES AND SHRUBS



Fruit trees budded from bearing orchards. Apple, Pear, Cherry, Peach, Plum, Prune, Apricot, Quince, Grape Vines, Shrubbery, Plants, Raspberries, Blackberries, Logans, Dewberries, Asparagus, Rhubarb, Flowering Shrubs, Roses, Vines, Hedge, Nut and Shade Trees. Carriage paid. Satisfaction guaranteed.

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Salesmen everywhere. More wanted.

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Advertising Rates on Application

VOL. XVII, NO. 2

Apple Market Factors

To the student of present conditions there is evidence that this is to be a difficult season for the marketing of the Northwest's apple crop.

One factor is to be the fact that most eastern apple growing districts have heavy crops. Another is that, despite the improving tone of business, the purchasing power of consumers in general is yet much below normal. A third is the experience of last season, when distributors received a setback after opening both the buying and selling quotations on boxed apples at comparatively high figures.

Perhaps some slight progress was made last year toward solving that ever troublesome problem of even distribution without glutting of certain centers. In the main, however, this trouble may be expected to bring about the usual amount of trouble and loss again this season.

These are not all the marketing factors that may cause concern for the apple grower and shipper but

should be sufficient to incite to careful study and preparation for the job of selling the crop successfully.

It is fortunate for the Northwest that the International Shippers' convention brought out here the big men connected with the business of marketing apples. They go away better informed as to conditions surrounding the producer. The grower, in turn, has learned more of the angles of the selling game. It is not mere idle talk to forecast that the net result will make for more effective marketing.

Obviously the great majority of growers' organizations and growers have already completed arrangements for the marketing of this year's crop. The thing to do then is to proceed conservatively. It would be more pleasing could we predict a strong market and high prices. To do so would be to ignore conditions as they exist. The situation does not at all justify pessimism. It merely warns that in the end the grower will feel best and fare best who counts on reasonably profitable prices and plans accordingly.

Fruit Properties

Too little emphasis is given the beneficial food properties of fresh fruits. One trouble is that too few persons even connected with the fruit industry really know what important elements needed in the human body are contained in the various fruits. The California Department of Agriculture recently performed a valuable service in compiling a list of these elements and properties.

Our readers will do well to give this information more than a casual reading. It may well be preserved for reference. The facts compiled are these:

Fresh fruit furnishes a valuable part of the meal, stimulates the jaded appetite, cools, refreshes and is easily assimilated.

Grapes contain blood building

constituents such as sugar, potash, salts, phosphoric acid, lime and iron.

Apples and pears contain phosphates, lime, albumen, and malic acid, and act as gentle laxatives.

Cherries and plums furnish phosphates, sugar and nitrogen.

Berries are good tonics for their acids, and salts of lime and iron.

Oranges are blood makers and laxatives.

Melons are largely water in combination with sugar and starch.

Lemon juice taken regularly is a valuable laxative, with a pronounced beneficial effect on torpid livers.

In children's diets oranges, berries or acid fruits should not be given along with milk. Continued use of fresh fruits will promote intestinal activity and reduce acidity of the blood.

Fruit has ceased to be a luxury. Even at higher prices for standard grades it is a wise and excellent investment.

Farm-Owned Cars

In the eleven states designated as "western" there is a motor car for every two farmers according to United States Census Bureau figures. Taking all other states as a group there is a motor car for every three farmers.

This must be taken as evidence that ranchers of the western states are fifty per cent more prosperous and progressive than their eastern brothers.

Perhaps the reader has noted how out-of-date a picture of an orchard scene now looks if it includes horse-drawn vehicles or apparatus.

One deduction is the fact that motor power has fully demonstrated its advantages over horse-flesh about the ranch. Another is that our western fruit sections contain much more than the average of financially successful ranchers. In other words, they are pretty fair sections in which to live and make your living.

Oregon Apples in India

HERE is interesting evidence of the extraordinary shipping quality of Yellow Newtown apples as sent us by H. T. Gill, manager of the Allen Orchard Estates at Ramgarh, Naini Tal, India.

"On the return from England to Cawnpore, India, of my principal, C. T. Allen, C. I. E., I was puzzled to get from him a box containing a few pounds of apples, but with no accompanying remarks. My reply expressed astonishment at receiving what I knew were obviously Yellow Newtowns—astonishment because I did not know of any of this fruit in India other than a number of trees of this variety which I had originally brought with me personally from Washington state, and which were not then in bearing.

"My surprise was more particularly at the absolute perfection of the fruit—there was not a blemish on the apples, and their taste was excellent (possibly a little on the dry, or mealy side, but not noticeably so).

"Could Mr. Allen have obtained them in India? If not, had he obtained them in England? The time of the year precluded the former, and the latter I could not understand, as I knew this variety did not grow successfully in England, at least to the excellence it attains in the west, while the condition of the fruit put all thoughts out of my head of its being obtained from imported supplies.

"The puzzle became clear, however, when I later received from my principal one of the original cases he had hurriedly purchased in Covent Garden, London, just prior to leaving for India—the ordinary standard bushel box, bearing the brand of the H. F. Davidson company, of Hood River, Oregon. These cases, just as received at Covent Garden market, had again been rushed on board a P. & O. liner, thence across to India without any special use of refrigerator storage en route; from Bombay another three days by rail to Central Upper India, (admittedly in the cool period of the year); a stay there awhile and unpacking, thence another three days' journey by a combination of rail and eventually coolie-transport from rail terminus to these orchards at 7,300 feet in the Himalayas.

"Knowing something of practically every stage of the 12,000-mile journey which these Newtown apples had taken, I can only express admiration for a system of packing and dispatch which renders such a remarkable result at all possible."

Several districts experienced shortages of help both in berry picking and apple thinning.

Please mention BETTER FRUIT when writing to advertisers.

Will they be dead when you get back?

THEY WILL if you spray with Hall's Nicotine Sulphate. Plant-lice, thrips and similar soft-bodied sucking insects can be wiped out by a systematic spraying with this powerful insecticide.

Authorities agree that Nicotine is the most effective contact poison known.

Hall's Nicotine Sulphate is guaranteed to contain 40% pure nicotine.

Being a vegetable extract it will not injure fruit or foliage.

And—made up as a spray its cost is only two cents a gallon.

Ten-pound tins—\$13.50 Two-pound tins—\$3.50 Half-pound tins—\$1.25.

Buy from your dealer. If he cannot supply you, order direct from us.



Hall's Tobacco Dust

For use where dusting is preferable to spraying.

Finely ground and guaranteed to contain a full 1% nicotine.

100-pound sack, \$4.50
2-pound drums .. .35



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FOR fifty years Myers Pumps have led the field. Myers Cog-Gear Hand Pump, Electric House Pump and Self-Oiling Bulldozer Power Pump are but three of this world famous line. All low in cost, simple, dependable.

(10) Myers means highest-quality Pumps, Door Hangers, Hay Tools. See your dealer or write

THE F. E. MYERS
& BRO. CO.
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Ashland, O.

PUMPS

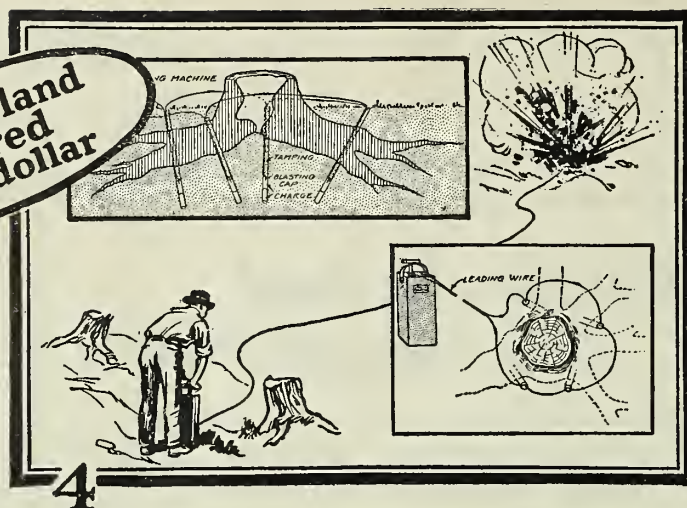
Pacific Northwest Distributors

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Buy From the Local Mitchell Dealer

**1/2 more land
cleared
per dollar**

—with **PACIFIC
STUMPING
POWDER**
Save still more by
using the latest,
cheapest blasting
methods—



Firing the Charge

THERE are two methods of firing a dynamite charge: (1) by means of cap and fuse, or, (2) by means of electric blasting caps and blasting machine.

When the cap and fuse method is used, the blaster must remember that the fuse burns at the rate of 32 to 40 seconds per foot, and must allow ample length of fuse to enable him to retire to a safe point before the explosion. Six inches of fuse out of the bore hole should be sufficient.

When blasting hollow stumps, better results will be obtained if separate charges are placed under the stump and its main lateral roots. These are fired at one time through the use of electric blasting caps and an electric blasting machine. This method can also be used, of course, to fire a single charge.

Pacific Stumping Powder, the new du Pont Farm Dynamite, has greatly reduced the cost of clearing land. 130 1 1/4 x 8 inch sticks cost but 50 cents more than 85 1 3/8 x 8 inch sticks of standard stumping powders. As they do the same work, stick for stick, the farmer will blast 1/2 more stumps per dollar.

Order Pacific Stumping Powder from your local dealer and write us for free 125-page book "The Development of Logged-Off Lands," giving full instructions covering the use of dynamite for land clearing, ditching and tree planting.

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NON-FREEZING

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STUMPING POWDER

**Kill Your Prune and
Peach Tree Borers**

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OR
NAPTHO**

Write us today for further information

MILLER PRODUCTS COMPANY
PORTLAND, OREGON

CORN HARVESTER Self Gathering for cutting Corn, Cane and Kaffir Corn. Cuts and throws in piles on harvester. Man and horse cuts and shocks equal to a Corn Binder. Sold in every state. Price only \$25 with fodder binder. The only self gathering corn harvester on the market, that is giving universal satisfaction.—Dexter L. Woodward, Sandy Creek, N. Y., writes: "3 years ago I purchased a Corn Harvester. Would not take 4 times the price of the machine if I could not get another one." Clarence F. Hugins, Spearmore, Okla., "Works 5 times better than I expected. Saved 40 dollars in labor this fall." Roy Apple, Farmersville, Ohio, "I have used a corn shocker, corn binder and 2 rowed machines, but your machine beats them all and takes less time of any machine I have ever used." John F. Haag, Mayfield, Oklahoma, "Your harvester gave good satisfaction while using filling our Silo." K. F. Ruegnitz, Otis, Colo., "Just received a letter from my father saying he received the corn binder and he is cutting corn and cane now. Says it works fine and that I can sell lots of them next year." Write for free catalog showing picture of harvester at work and testimonials.
PROCESS MFG. CO. Salina, Kansas

Disease Factor in Commercial Pomology

(Continued from page 6)

carbon dioxide and humidity relation and the real problem of transportation of fruits is one of determining the best conditions for storage.

The car should be loaded to secure maximum ventilation, refrigeration and stability. The packages should be spaced widely enough apart to allow a free circulation of air, but not so wide as to permit shifting. False flooring should be installed in the car so as to give maximum circulation around and through the load. The height of the load should be so the top tier of packages is below the line of safe refrigeration and well within the cooler portion of the car. Over-loading is dangerous because it checks air circulation and thus defeats the very purpose of refrigeration.

All packages with flat bottom should be stripped between each tier. This hastens refrigeration, helps to secure rigidity and distributes the weight of the load more evenly over the packages. Two strips are used to each tier of packages and each strip should be secured with nails to prevent shifting.

Generally, cars should be loaded systematically with the space in the doorway left for bracing and refrigeration. Bracing should be such as to prevent shifting and breaking of the packages.

Nurserymen Meet

THE twentieth anniversary convention of the Pacific Coast Association of nurserymen was held in Portland July 11, 12 and 13, and was attended by delegates from California, British Columbia, Washington, Oregon, Idaho and Utah. There were a number of good programs, helpful demonstrations and business actions of importance to all nurserymen of the north-west.

Boise, Idaho, was selected as the place for next year's convention and these officers were elected: Charles T. Hawkes, Caldwell, Idaho, president; C. B. Miller of Milton, Ore., F. W. May of Yakima, Wash., F. E. Walton of Salt Lake, Utah, M. R. Jackson of Fresno, Cal., and Richard Layritz of Victoria, B. C., vice-presidents; C. A. Tonneson, Burton, Wash., executive secretary.

Annual surveys are to be undertaken by the association as a means of avoiding over-supply or under-supply of nursery stock. As a means of discouraging misleading advertising the members pledged themselves not to patronize a publication which carries any such advertising. The association went on record as favoring greater co-operation with federal, state and county officials in the matter of stock inspections.

Future of Fruit-Growing

By DANIEL PROWANT
Continental, Ohio

THE writer can not help feeling optimistic regarding the future of the fruit grower who is giving the business his entire attention. Everywhere I go it seems that most farmers are giving less attention to the small farm orchard each year, and hundreds of the once fine farm orchards are today, if not entirely extinct, in such a sad state of neglect it would be better for all concerned if they were removed.

Now this can mean nothing less than a golden opportunity for the man who likes to care for trees and plants, has a practical working knowledge of fruit-growing, a small farm and a little capital to put into the business, and the courage to work and win. Of course, in the established fruit growing sections, where fruit is grown in a commercial way, the evidence of neglect is not so noticeable, but only a few years ago everyone except the city dweller usually grew his own supply of fruit. With the average farmer discontinuing this side line, it looks to me as if some new markets would be opened to the energetic fruit grower, and good prices assured.

There is no intent to leave the impression that fruit growing is all profit and no expense, for this is far from the truth. Neither do I advise anyone to undertake fruit growing hastily and without having made proper preparations for the venture, at least a year or two in advance.

Drainage is of utmost importance in fruit growing, and the soil must be reasonably fertile. The prospective fruit grower should find out before ordering his nursery stock what varieties are best adapted to his soil and climate. This is something it does not always pay to take the nurseryman's word for, nor can published information along this line always be relied on. In each case I have no doubt but what the informant tries to give accurate information, but local conditions have so much to do with matters of this kind that I think it best to get such information either from the state experiment station or from some successful orchardist as near home and working under as nearly similar conditions as possible.

I am inclined to think that the biggest profits in the future fruit growing industry will center more on the berries and small stone fruits, rather than on apples, pears and peaches. There seems to be a common idea in the minds of many persons that berries and small fruits are more difficult to raise than the larger fruits. I do not find this to be true, but find the smaller fruits to be the more profitable.

This is due to the fact that unless a late

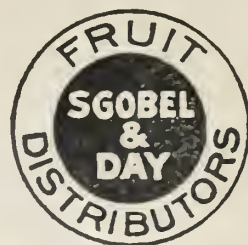
frost or something out of the ordinary destroys the blossoms, the small fruits are almost certain croppers each season. For this reason the grower knows about what he can depend on and does not usually fear a glutted market, which is something that happens to the apple grower almost every season when the crop is abundant. This statement may arouse some criticism from the apple growers, yet it is true with us, and I know that it is true in many other places.

THE initial expense of stocking a fruit farm is no small item at present, and I would not advise anyone to encumber himself too deeply with debts to start with, especially if he is not familiar with the work. It would be better, I think, to start on a smaller scale, and enlarge the fruit growing area each year or two, as financial circumstances permit. If some of us had been shrewd enough to for see the possibilities of fruit growing a number of years ago, when labor and nursery stock were much cheaper than they are today, and would have had a small fruit farm ready to begin bearing at the present time, we would be in a position to make money.

However, in our own case, we have about all the trees and plants we can take care of properly, and are perhaps making more than we would with a larger amount. I want to call attention to the fact that a small acreage devoted to fruit culture, where the trees and plants are cultivated, pruned, sprayed, mulched and otherwise properly cared for at the proper season, will bring larger financial returns than a large acreage improperly cared for.

So far as the expenses for spraying equipment and tools for cultivating the soil and caring for the trees and plants are concerned I do not find it as large as often supposed. In many cases new fruit growers are deluded into purchasing much more expensive equipment than they need. I do not find the most elaborate equipment always the most practical or profitable. It may be all right to tie up a small fortune in equipment after the business is firmly established and on a profitable basis, but if the beginner attempts it that is usually about as far as he gets.

Corrosive sublimate 1 to 1000—that is 1 ounce to 12 gallons of water—applied at the rate of one-half cup about the base of cabbage, cauliflower and similar plants will give effective control for root maggots. Three applications should be made at 10-day intervals.



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Established 1869

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Exclusive Distributors for

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FRUIT
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SIMPSON & DOELLER
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PORTLAND, OREGON.

**GET OUR SAMPLES
AND PRICES**

**WE CAN FILL YOUR
ORDER FOR STOCK
APPLE, PEAR, CHERRY
AND STRAWBERRY LABELS
IN 24 HOURS.**

Leaf curl and drop of peaches are largely due to lack of Nitrogen and have been reduced or prevented by fertilizing in the Spring with

Nitrate of Soda

two or three pounds to the tree. All fruits are benefited by a liberal supply of Nitrate Nitrogen. Send for my FREE BULLETINS.

Dr. William S. Myers, Director
25 Madison Avenue New York



YOU'LL be surprised at the little cost at which you can make your house look distinctive. The window cut accompanying this ad, is known as the "Queen Anne" design.

For an additional \$15 or \$20 your whole house can have this classy window. Before you finish building send for our catalog. Rovig, 2227 First Avenue South, Seattle. "Better Millwork."

Filbert Culture and Varieties

By C. A. READ

*Nut Culturist, United States Department of Agriculture
(Continued from last month)*

HAVING finished consideration of the desirable points for good varieties of filberts it remains only to give brief analysis of the individual varieties. We take them up in alphabetical order, as follows:

ALGIERS—From all that can be learned, this is the same variety as is also known as de Alger, or d'Alger. It is strigingly like the Barcelona. It resembles that variety so closely that it may be advisable to recognize it under that name. However, it has not yet been grown under identical conditions sufficient length of time to fully determine its exact difference or points of similarity.

ALPHA—A variety which for many years has successfully been used by A. A. Quarnberg as a pollenizer for other kinds. It has but recently been named.

THE AVELINES—This group includes the Aveline Grosse Ronde and the purple, red, and white Aveline. It is doubtful whether any of these are to be recommended for commercial planting. All are much alike, particularly Aveline Grosse Ronde and the white Aveline. These trees are good bearers when under favorable conditions of culture. The red Aveline is not a strong grower and the purple Aveline is a shy bearer. The last is especially useful for decorative purposes, particularly when foliage of high color is wanted in early spring. None of the Avelines are self-fertile to any extent. However, the white Aveline is a good pollenizer for certain other sorts. The Avelines are among the most difficult to husk of all varieties and are not to be recommended for extensive orchard planting until husking machinery shall have been perfected and made available.

BARCELONA—Among all varieties thus far generally known or tested in this country, that introduced under the European name of Gross Blanche de Angleterre by Felix Gillet, but by him changed to Barcelona, is easily the most desirable. It combines many of the points essential to the makeup of a good variety. Under some conditions it is seemingly self-fertile. However, it should not be planted alone, as a high proportion of the nuts will be blanks. It is of the round type, somewhat wedge shaped at the apex and of medium to large size. It is so well thought of by experienced planters in this section that by many it is being planted exclusively, with others only as pollenizers. Of it, Mr. Quarnberg, who visited England two years ago during the filbert harvest in Kent County, said: "There was nothing better over there and it remained to be seen whether there was anything as good."

BARCELONA B—This is a tentative name only, given by Dr. J. H. Wilkins of McMinnville, Oregon, to a variety originating on his place, which closely resembles true Barcelona. If it proves to be distinct and superior to that variety it will be given a definite and independent name.

BERGERI—One of the varieties under test by Mr. Quarnberg which apparently has no special points of superiority. Thus far it has been a shy bearer and unless it soon develops points to commend it, it will be abandoned.

BRIXNUT—One of the several varieties out of 5000 seedlings tested by C. T. Brixey of McMinnville, Oregon, which he regards favorably. The few nuts yet produced have been of Barcelona type, but considerably larger than is common for that variety and more prolific. Well worthy of further observation.

BRUNSWICK—A member of the cob group so much like Du Chilly as to be practically indistinguishable. However, Mr. Quarnberg finds it much subject to budmite, to which Du Chilly, as known by him, is practically resistant. Apparently there is no reason to continue this variety.

CHAPERONE—A seedling Barcelona nut bought in Portland and grown by Mr. Brixey. Regarded by him as an excellent pollenizer for several other varieties. Not proposed for nut production.

CLACKAMAS—A variety originated by H. A. Kruse of Sherwood from a lot of trees bought as named varieties. A shy bearer, but a heavy pollenizer. Named by Mr. Quarnberg in honor of the county in which it appeared.

CLUSTER—An English variety, which so far as known is grown here only by U. S. Senator C. L. McNary at Salem. Much like White Aveline, but somewhat larger. The senator finds it to bloom midway between Barcelona and Du Chilly and like the White Aveline to be a good pollenizer for both.

COSFORD—Described by Geo. Bunyard & Company, Ltd., proprietors of the Royal nurseries, Maidstone, England, in their 1915-16 catalog as follows:

"Nut almost round, large, most excellent flavor, and very thin shell. A prolific variety and recommended as a pollenizer for filberts of less fertile sorts."

As grown by Mr. Quarnberg, the nuts are of Du Chilly type, but considerably smaller. He finds it a shy bearer.

COWELL—A variety discovered on the "Cowell place," near Los Angeles, by George A. Dorris at Springfield, it is an excellent pollenizer for Barcelona and Du Chilly, but as known to Mr. Quarn-

berg at Vancouver, Wash., it does not pollinize Du Chilly. It is suspected that the DuChillys at the two places may not be the same. However, at each place the Daviana is highly subject to budmite. It is recommended only as a pollinizer for other varieties.

DU BEARN—One of the lesser known varieties under test by Mr. Quarnberg. Apparently, it is not to be recommended at this time.

DU CHILLY—One of the large well-known varieties, closely resembling the Kentish Cob and the Brunswick. As already indicated in the discussion under Daviana, it is not improbable that several varieties are being grown in this country under the name Du Chilly. Wherever it is planted, it should be provided with an abundance of pollen from other good varieties.

The usual report as to comparative bearing habits of the Du Chilly with those of Barcelona is that the latter produces from four to six times as large crops under the same conditions. The Growers' Exchange at Salem reports considerable complaint from buyers because of blank nuts among the Du Chilly. On the other hand, Mr. Quarnberg, who has made an intensive study of pollinizers, finds the Du Chilly nearly as productive as Barcelona and the demand greater at four cents a pound more.

DUKE OF EDINBURG—A variety little known here. English catalogs claim it to be of superior flavor.

DU PROVINCE—Mr. Quarnberg has a small tree in a much-crowded position which came to him under this name. His immediate neighbor and brother-in-law Nat Norelius, has a larger tree within 300 feet which Mr. Quarnberg firmly believes to be the same. However, before being identified by Mr. Quarnberg, it was called Clark County Cob by Mr. Norelius. The nuts are small, but although commanding a proportionately low price, Mr. Norelius finds it the most profitable tree on the place. His tree has never thrown out suckers.

FERTILE DE COUTARD—A shy bearer tested for some year by Mr. Quarnberg who expects to abandon it soon.

GEANTES DE HALLE (GEANTES DE CALLE)—Apparently these two are the same in every way. The former appears to be the more correct name. The nuts are conical in form, large, attractive in appearance, and have many good points. However, they have no apparent advantages over Barcelona and there is no evident reason why they should be grown.

IMPERIALE DE TRIBEZONDE—The bearing habits of this variety and the attractive appearance of the nuts should strongly commend it to planters for observation. The tree is a slow and conspicuously awkward grower, but a heavy bearer. The nuts are of good size and

among the handsomest of all varieties. It is suggested that the name be shortened to Imperial in conformity with American rules of nomenclature.

IMPERATRICE EUGENIE—Much like Daviana to which it does not appear to be superior.

KENTISH COB—Said by the Royal Nursery catalog to be "the best for all around use." Here it has been found much like Du Chilly, but inferior to it.

KENTISH FILBERT—Described in the same catalog as the above, as being very choice as a nut and although "of great antiquity, having been grown in Kent for a long time," it has "been almost super-

ceded by the Kentish Cob." It is much like our Du Chilly.

KRUSE—A new but prolific sort of the Barcelona type to which it may be somewhat superior in point of productivity. The tree is a less strong grower. From Homer A. Kruse, Sherwood.

LACINIATE—A weak growing variety with cut-leave foliage. Of doubtful use as an ornamental only.

MACROCARPA—As grown by Mr. Quarnberg, this is one of the largest varieties. It is of attractive appearance, thin-shelled and the kernel is of pleasing flavor. However, it is a light bearer and therefore not of special interest. A quite

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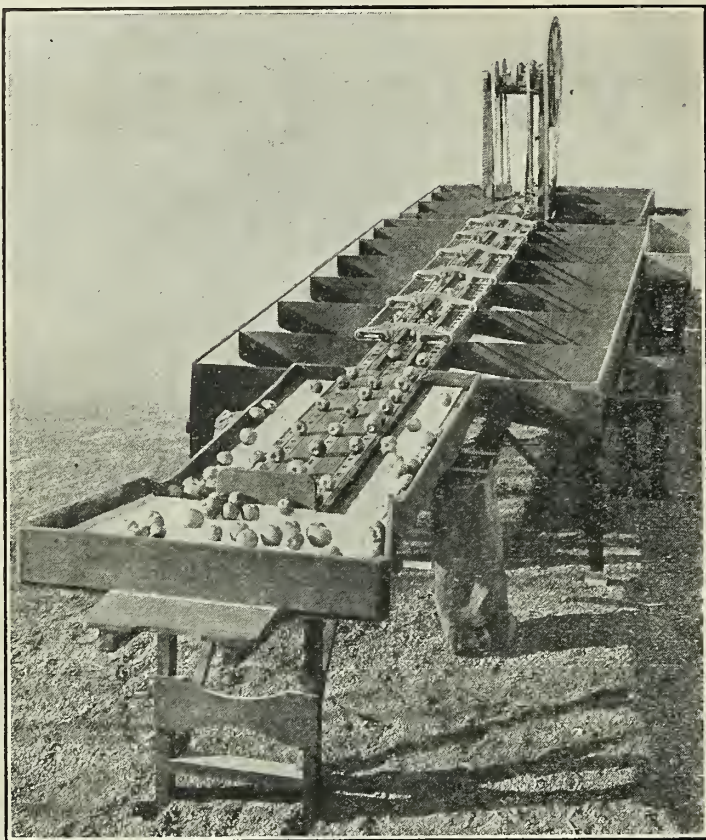
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Deer Park Lumber Co.....Deer Park, Wash.	Shevlin-Hixon Co.....Bend, Ore.
Dewey Lumber Co.....Polson, Mont.	Union Box Co.....La Grande, Ore.
W. H. Eccles Lumber Co.....Baker, Ore.	Wilson and Cahill.....Spokane, Wash.
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different variety is grown at the Oregon Agricultural Experiment Station under this name. It is proving to be an excellent pollenizer.

MERVILLE DE BOLLWYLLER—Grown by Mr. Quarnberg at Vancouver, Senator McNary of Salm, C. E. Parsons at Nevada City, Colo., and by Conrad Voltersen at Rochester, New York. No one reports it to be a heavy bearer. The name of Bollwyller is suggested.

MONTEBELLO—A dense growing tree much like Barcelona. A good bearer of nuts much like Barcelona, but smaller. Apparently this variety has no points of advantage over Barcelona.

NOCE LUNGHE—This is an excellent variety in many ways. It is a good bearer and the nuts are amply large and attractive. Nuts of the Noce Lunghe are difficult to husk and on the whole the variety is of doubtful commercial value.

NOTTINGHAM—So far as husking quality is concerned, this variety is hardly to be beaten. It is one of the heavy annual bearers. The nuts are of about the same size as are the Avelines. If it should prove to be a good pollenizer, it would probably quickly supersede both White Aveline and Aveline Gross Ronde.

PEARSON'S PROLIFIC—Not yet well known or adequately tested in this country. Regarded in England as an abundant and early bearer, "valuable for cross pollenization purposes."

PRINCESS ROYAL—Thus far an ex-

tremely shy bearer in the Quarnberg orchards. Apparently not worth retaining.

PROLIFIC FILBERT—Described in the catalog of the Royal Nurseries as follows: "Curiously frizzled husk, nuts small but produced in large clusters, often 10 to a husk; very early and good. Sometimes called the Frizzled Nut."

ROBERTA—One of the several varieties originated by Mr. Kruse. A good bearer and regarded as being worthy of further observation.

RUDY—A very new variety discovered by Mr. Gray who regards it as an excellent pollenizer. Little propagated thus far.

SICILY—Also one of Mr. Kruse's varieties. A good pollenizer, but shy bearer. In form this is of unusual beauty, being of compact and very erect goblet shape. Mr. Kruse has topworked most of his trees to more prolific kinds. This variety should be especially valuable for decorative planting, particularly along roads or private driveways.

Following the order of classification of varieties proposed earlier in this address, Professors C. E. Schuster and C. I. Lewis, have assisted in the following arrangement:

COMMERCIALS—Barcelon, Du Chilly.

PROMISING—"Barcelon B," Brixnut, Cowell, Imperial, Kruse.

POLLENIZERS—Alpha, White Aveline, Chaperone, Clackamas, Cluster, Daviana, Macrocarpa (of O. A. C.), Bollwyller, Nottingham, Rudy.

DOUBTFULS—Bergeri, Cosford, Du Bearn, Du Province, Geantes (de Halle), Montebello, Noce Lunghe, Pearson.

DISCARDS—Red Aveline, Purple Aveline, Aveline Grosse Ronde, Brunswick, Fertile de Coutard, Empress Eugenie, Kentish Cob, Kentish Filbert, Lacinate, Princess Royal, Prolific.

Ousting the Prune Root Borer

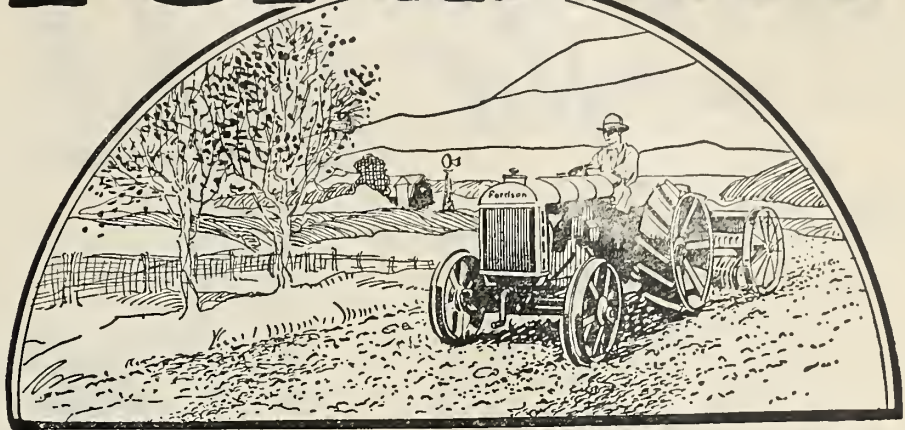
(Continued from page 8)

do) about five or six inches wide, should be fitted about the base of the tree. This should be fitted a few inches above the former soil level, and may be held in place by a single carpet tack. With a little care this collar can be made to fit tightly about the tree at the top, and may be loose at the bottom.

The purpose of this collar is to protect the tree from direct contact with the naphthalene fumes below the soil level. More or less injury to the tree is likely to result if the collar is left off.

The wash is then applied by means of a whitewash brush. The paper collar and the tree trunk should be coated to a height of fourteen to sixteen inches. Care should be taken to obtain a good coating of the wash which should be one-

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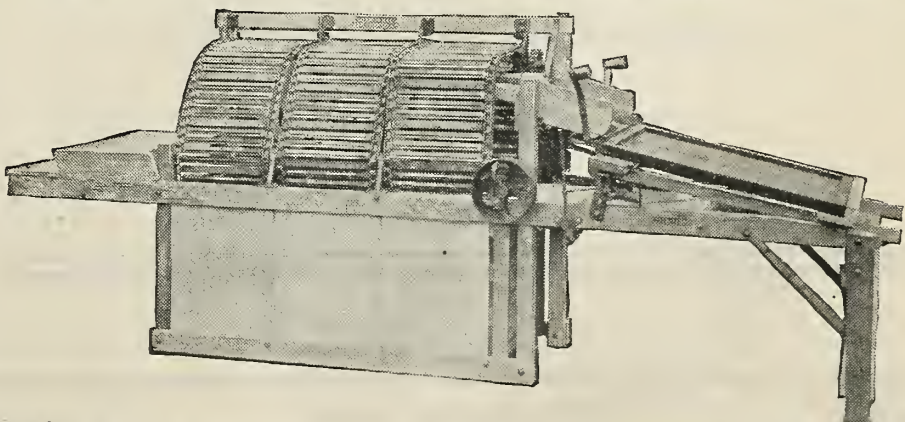
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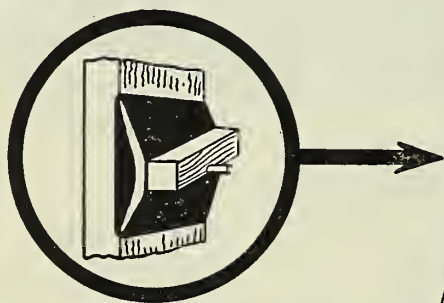
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eighth of an inch thick when dry. Be sure not to leave a crack in the wash at the top of the paper collar. After the wash has dried the soil should be replaced about the base of the tree.

WHEN TO APPLY WASH—The first application of the naphthalene wash should be made during the last week of June or the first week of July. Our tests indicate that a second application is advisable in heavily infested orchards. This should be made during mid-August. In making the second application the soil at the bases of the trees need not be removed; the wash being applied only above the soil surface.

Where the process of cutting out the worms is practiced in the spring, "worming" may be done in connection with the first application of the wash.

PROTECTORS FOR YOUNG TREES—The paradichlorobenzene treatment is likely to injure trees less than six years old. It is difficult to make a whitewash stick to a tree which is small enough to be swayed by the wind. Consequently neither of these treatments is entirely satisfactory for use on very young trees.

The Oregon Experiment Station has developed a protector which promises good results on small trees.

A strip of cheap grade roofing paper is cut in two lengthwise, each half being eighteen inches wide. If a large number of trees are to be treated a roll of roofing paper may be sawed through the middle with an old saw.

Now cut the paper into pieces long enough to be made into cylinders which will fit around the trunk of the tree, leaving an inch space between the paper and the tree trunk on every side. The paper must be long enough to overlap, so that the edges may be fastened.

APPLYING PROTECTORS—Dig the soil away from the tree slightly. Then apply the cylinder of roofing paper about the trunk of the tree, leaving about one inch distance between the paper and the trunk of the tree on every side. The edges of the roofing paper cylinder should overlap each other two or three inches, and should be fastened by means of wires or metal clips at the top, bottom, and middle. The soil is then banked slightly about the base of the protector to hold it in position.

After the protector is in place a quantity of flake naphthalene should be sprinkled evenly about the tree on the soil inside of the protector. If the tree is less than three inches in diameter, use one-half ounce of the naphthalene. The application of the protector is now complete.

If the cylinder is properly placed and care is used in cultivating, the protector should last for several seasons. It will be necessary merely to place a little more naphthalene in the cylinder each spring until the tree outgrows the protector.

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Review of 1921 Apple Season

THE northwestern boxed apple season of 1921-22 closed with general satisfaction to most of the growers. The crop was not only the largest in the history of the industry, but its general merchantability from the standpoint of size, color and finish was perhaps the best ever attained. Costs of production were lower than for the preceding season, due to the decrease in labor and most material costs. The returns were generally good, and liquidation of the crop was probably more prompt than for many seasons, says the government's annual review of the past boxed apple season.

From the standpoint of the buyers and shippers, the season was not without its disappointments. The fact that severe freezes early in the spring practically wiped out the apple crops of the big producing regions of Missouri, Arkansas, Virginia, Pennsylvania, New York, Michigan and other states, gave prospects of a short crop, misled many and opening prices were artificially high. They were not justified in the light of good merchandising. General business throughout the territory in which boxed stock is distributed had been depressed, resulting in low buying power; and, because northwestern apples are generally looked upon as luxuries and eaten out of hand to a large extent, this low buying power, accompanied with high opening prices greatly curtailed consumption.

Severe car shortages occurring in the latter part of September, fully two weeks before expected, resulted in a backing up all along the line of the flow of fruit from the orchard to market. The outgrowth of this was overcrowding in packing houses, warehouses and even orchards. Packing schedules were also upset, culminating in rapid ripening of such varieties as Jonathans and Delicious, which when placed on the markets brought about generally lower prices and many rejections with attendant losses.

From the standpoint of the eastern receivers and distributors, the season was "just another year of general losses on boxed apples," due to high prices paid for liberal supplies of early stock and low buying power of consumers, as large supplies of early stocks were left in their hands at a time when the receivers should have been ready to take later and harder varieties.

Thus it is seen that the grower may well be satisfied with the season's results, but that other factors in the distribution and consumption of the crop have little with which to be gratified in view of the earlier prospects.

OCEAN TRANSPORTATION—One of the new angles of development was the increased tonnage moving by water from Pacific coast ports. The year 1921

marked the first refrigerated shipment of apples from the Pacific northwest to the Atlantic seaboard, and the first "all water" exports via the Panama canal. The favor with which this means of transportation met is best shown by figures on shipments from the two principal Pacific coast shipping ports, Portland and Seattle.

UP TO MARCH 1, there had been shipped from Portland 433,306 boxes and from Seattle 306,801 boxes. This is an increase of 305,081 boxes over the 1919 shipments from Seattle and 220,393 boxes over the 1920 movement from the same port, while practically no shipments had ever moved from Portland before.

With sufficiently low rates to permit absorption of rail freight from initial producing points to the Pacific seaboard, absorption of short-haul rates from Atlantic terminals inland for a reasonable distance, frequent and regular sailings, convenient terminals at Atlantic ports of discharge, and an increase in the number of discharging ports, this feature of the handling of the northwestern apple crop is expected to assume even greater proportions in the future.

DISTRIBUTION OF VARIETIES—Wenatchee and Yakima last year supplied the greater portion of the Winesaps, Jonathans and Delicious. Idaho, with a crop almost three times its former production, helped to increase Jonathan shipments. It also added considerably to the supply of Romes, which were principally provided by Yakima, Wenatchee, and Spokane districts. The White Salmon, Hood River and other Oregon districts produced the bulk of the Newtown and Spitzenburg varieties.

As the result of a careful canvass of each of the various producing districts in Oregon, Washington and Idaho, the approximate proportion of the principal varieties produced in the northwest last year were determined. The following percentages are the result of this canvass and may be considered a very close estimate although not absolutely accurate: Winesaps 34 per cent, Romes 16, Jonathans 15, Delicious 14, Newtowns 5, Spitzenburgs 4, miscellaneous varieties 12.

A year ago I subscribed to your "live-wire" magazine which I have read eagerly each month as it has arrived. Your semi-technical articles have been of special interest to me as I am also engaged in the business of fruit growing. We are going to test out spreaders as outlined in your recent issues.—Robert A. Harris, New Jersey.

The 1922 annual meeting of the Oregon Horticultural Society will be held at Corvallis, November 22-24.

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Cane Maggots at Work

New, tender shoots of raspberry and loganberry are frequently found with their tops blighted and curled down in characteristic "limberneck" fashion. A closer examination of the injured cane will reveal a bluish girdle just under the bark at the base of the blight tip. Cutting into the interior will often show the culprit—a small whitish maggot within the pith. Infected canes should be cut out well below the girdle and destroyed as no spray or treatment known at present is effective against this insect.

OREGON

FERRIS M. GREEN has been named fruit inspector in Hood River County and took up his duties last month. He is a graduate of Oregon Agricultural College and has had practical experience in orchards of Washington and California.

▲ ▲ ▲

THE Salem district suffered from a serious shortage of berry pickers, particularly for logans. At one time all business houses closed and citizens flocked to the aid of the growers.

▲ ▲ ▲

NEWBERG held its second annual berry festival on July 8. There were a lot of splendid exhibits, assembled under direction of F. A. Morris.

▲ ▲ ▲

THE cherry crop around Freewater was about equal to that of last year. Shipments aggregated 35 cars.

▲ ▲ ▲

REPORT has it that a carload order of gallon cans of water-pack apples sent to New York last fall from the Falls City cannery, affiliated with the Oregon Growers, has resulted in an order for ten carloads of this year's product.

▲ ▲ ▲

THE prune crop in Polk County was light during the past two seasons, but promises to be a bumper one this year. The buyers began by offering 7½ cents for 50-60 sizes.

▲ ▲ ▲

PEACH shipments from Ashland approximated 50 carloads at last report and the growers expected to net above \$1200 per car. Apple shipments are expected to be about 20 cars and those of pears, berries and small fruits about 30 cars.

▲ ▲ ▲

HOOD RIVER early reported a rise in the price of apple boxes from 13 to 15 cents. Betterment of lumber market conditions was assigned as the reason.

▲ ▲ ▲

AT A RECENT meeting of directors of the Oregon Growers' Co-operative Association plans were laid for formation of one large district to be known as the Willamette Valley district, in which a uniform scale of six cents a box will be paid to prune pickers. Packers will be given a two-cent bonus.

DAN W. JORDAN of Parkdale has purchased from C. M. Uptegrove the latter's 30-acre orchard ranch in the Mt. Hood section. Mr. Jordan now owns 90 acres of trees and says he will enlarge this acreage by planting more apples and pears next spring.

THE Oregon Growers last month obtained an injunction order restraining August Lentz, berry grower near Salem, from selling his \$5000 crop to other interests. It was alleged that he had already violated his contract in selling part of his crop to other parties.

FOLLOWING announcement of the Portland Dock Commission that it will provide storage facilities for 300,000 boxes of apples at the shipping terminal, Chairman John H. Burgard and Engineer G. B. Hegardt made a study of the ventilated storage of Dan Wuille & Co., at Hood River.

SOON after assuming his new duties as county horticultural inspector, F. M. Green reported at Hood River that he found fire blight in orchards between that city and Mosier and the Fir district and also in the Pardale section.

WHEN the hot weather ripened the strawberry crop around Salem much faster than it could be handled the growers availed themselves of the use of the newly provided cooling rooms of the Capital Ice & Storage Company. There were 14,000 cases in the plant at one time and many of these would have been lost, but for the new facilities at hand.

THE Mid-Columbia peach crop was unusually light this year, Robert Tazwell and S. G. Oxborrow, the two leading growers, obtaining only about 500 boxes each from their orchards.

WAGES paid berry pickers in Washington districts were generally quite uniform. Thirty cents a crate was paid for strawberries; 40 cents a crate for raspberries, with 10-cent bonus where plants were two years old and over, and 50 cents a crate, with 10-cent bonus, where they were one year old. The bonus was paid only to pickers remaining until the end of the season.

WALTER G. SEELEY, for five years with the old North Pacific Fruit Distributors, as assistant sales manager and general eastern sales manager, has been named sales manager of the Yakima Shippers, Inc., a new organization of buyers and distributors.

ON ACCOUNT of the prevalence of white pine blister rust the State Department of Agriculture has ordered the destruction of all black currant bushes west of the Cascades and prohibited the shipment of currant and gooseberry bushes from one county to another.

AT DONALD, the Donald Fruit Growers, Inc., has been formed as a selling organization and also one that will purchase needed supplies for the members. The trustees are J. F. McCurdy, Andrew Olsen, Park Wise and E. S. Robertson.

THE Associated Growers' Exchange has purchased the warehouse at Grandview formerly owned by White Brothers & Crum.

THE fruit ranch of John Bergman, just east of Zillah has been sold to C. A. Peterson of Fairview, long a resident in the Yakima Valley. The Bergman family has moved to Seattle.

FRUIT inspectors throughout the state will this year be empowered to issue state and federal inspection certificates during the ap-



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ple-packing season. Except in unusual cases this system is expected to eliminate necessity for re-inspection at receiving markets.

THE strawberry crop grown in the Spokane Valley and on Green Bluff amounted to 100,000 crates, all marketed through Spokane commission houses. The average retail price was \$1.75 a crate.

CANNERY interests at Yakima began by offering \$50 a ton for pears 2½ inches in diameter, or the equivalent of \$1.60 per packed box.

LATE in July it was announced that the campaign at Wenatchee to sign up 18,000 acres of trees to participate in the "Eat Wenatchee Apples" advertising effort had been successfully terminated.

THE Wenatchee District Co-operative Association sold its tonnage of cherries, amounting to 150 tons, to the Oregon Packing Com-

pany, which did purchasing for the California Packing Corporation. Eight cents a pound was the delivered price.

CHERRY shipments from Yakima closely approximated 100 cars. The final consignments went out about a week ago. Because of frost and pollenization problems the crop yield varied greatly.

ACCORDING to latest reports, cherry shipments from Wenatchee were to reach 140 cars. This was quite a marked increase over early estimates.

PROSSER'S first shipment of apples was sent to the Seattle market on July 17 by express. Mrs. F. E. Offield was the shipper.

THE White Salmon district, according to late estimates, will probably not ship more than 375 cars of apples this year as compared with 500 last season. The shortage is largely in Newtowns, which are about 50 per cent of a crop.

THE first car of Yakima apples sent from the Yakima Valley was shipped from Donald on July 14. They were Yellow Transparents of good quality and went to Canadian markets.

CALIFORNIA

THE state's production of dried apricots last season amounted to about 25,000,000 pounds. This season's production will be smaller because of the higher price for fresh apricots. Opening prices for the new crop were reported as 17½ to 27½ cents.

THE second vacuum fumigator for the treatment of nursery stock has been installed on property of the Lemon Heights Nursery Company, at Tustin. The work of installation was supervised by D. B. Mackie of the California Department of Agriculture.

TO LEARN whether it pays to ship cherries to Europe, the crop from a 700-acre orchard near Redlands, was recently sent forward on the motorship *Cardiganshire*. Reports from the shipment have not yet been received.

THE opening price for green apricots at Watsonville was set at \$100 a ton by the Fruit Growers' Exchange of San Jose. The California Packing Corporation is said to have purchased a large portion of the crop at this price through the exchange.

FRANCIS M. COE of Oregon Agricultural College has been appointed an inspector in the state bureau of standardization and was first located at Merced to assist in inspection of tomatoes.

EARL WILSON has been appointed assistant chief of the division of plant industry. S. V. Christerson, standardization inspector of the department of agriculture, has resigned to enter the fruit and vegetable business at Watsonville.

THE 1921 season is reported to have been the best in the history of the California Walnut Growers' Association, but a still better record is in sight for this year. Last season the association handled 1,740,000 pounds of walnuts, as compared with 800,000 pounds in 1920.

HEADQUARTERS of the California Co-operative Canneries has been moved to San Francisco. Heretofore only a branch has been maintained there, with the main offices located at San Jose.

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IT IS SAID that of the 28 varieties of prunes in the test plot on the ranch of W. D. Butler, horticultural commissioner, at Napa, the Stewart has given best results. This prune dried out 29 per cent heavier than the Imperials last year, it was found.

RECEIVING a price of \$85 a ton, P. E. Van Pelt, Stanislaus County, got practically \$425 an acre from five acres of five-year-old apricot trees.

ORCHARD trees in Butte County number 18,890 bearing and 6,309 non-bearing, according to report compiled by Horticultural Commissioner Earl Mills.

THE value of the peach crop within a ten-mile radius of Pomona has been estimated at \$2,500,000. Six large canneries, with day and night forces, were engaged in taking care of the crop.

APPLE shipping in Sutter County began early last month. White Astrachans were the first apples sent out.

A GROSS return of \$2,440 on two acres of 15-year-old Royal Ann cherries was reported by C. C. Turner of the Langworth section. He picked between 14 and 15 tons and sold to the Modesto cannery at \$175 a ton.

NEARLY \$1,000,000 was paid out to grower members of the California Prune and Apricot Growers' Association last month as their third payment on 1921 prunes. Final settlement will be made before September 1.

IDAHO

LATE estimates on the peach crop of the state place it at 300 cars. Shipments last season amounted to 178 cars.

ESTIMATES of authorities are to the effect that Idaho will send out 2500 cars of prunes as compared with 2200 cars last year. Reports of a rather heavy drop have been received, however, so it is said that possibly the estimate may be cut somewhat.

LETTUCE plantings around Nampa, Caldwell and Parma in the Boise Valley and at Twin Falls are unusually heavy this season. Most of the plantings were made during July and the movement will be on during October and November.

APPLES, peaches, prunes and potatoes will be shipped this season by the Payette Valley Produce Exchange, organized this year at Payette.

Marketing News of Interest

ALTHOUGH the preliminary estimate of the United States Department of Agriculture, forecasting a total crop of 60,000,000 barrels of apples in the United States this year, is barely above the 5-year average, it is a little more than 27,333,000 barrels, or to be exact, 82,000,000 bushels or 84 per cent above last year's crop. The 1920 production was approximately 74,666,000 barrels or 224,000,000 bushels. The commercial crop to be shipped to market will, of course, be much less than the total crop. Last year's production was far below normal in most of the leading commercial sections except the Northwest and California.

The geographic distribution of the crop is greatly changed from last year. Eastern ap-

ples were so scarce in 1921 that Nova Scotia apples were sold in Richmond, Va., and the plentiful supplies of the Pacific Northwest were extensively used in eastern markets. This year prospects point to a more even distribution of apple production throughout the country.

PRODUCTION of boxed apples in Washington, Oregon, Idaho, California, Utah and Colorado is now estimated at approximately 5,757,000 boxes below last year's. Washington is credited with about 6,308,000 boxes less than last year when it shipped 33,000 carloads during the season which ended last June. This is 12,000 more than the 1920-21 season.

Prospects for this year's crop indicate a decrease of 20 per cent in production. Forecasts for this year's as compared with last year's follow: Colorado, 3,863,000 boxes, compared with 3,200,000 boxes; Utah, 1,007,000 with 1,037,000; Idaho, 3,800,000 with 4,280,000; Washington, 22,754,000 with 29,062,000; Oregon, 5,248,000 with 5,571,000; California, 7,221,000 with 5,500,000.

THE federal bureau of crop estimates at Spokane, in its forecast of July 1, said that the total apple crop in Washington this season, based on existing conditions, was estimated to be 27,000,000 bushels, as compared with 29,062,000 bushels produced in 1921. The forecast on the commercial crop of the state was 22,410,000 bushels (7,470,000 barrels) against 24,908,000 bushels (8,303,000 barrels) last year.

Conditions forecast a Washington peach crop of 1,211,000 bushels against 772,000 bushels last year. The estimate on pear crop was 1,639,000 bushels, as compared with the 1921 crop of 1,710,000 bushels. Grapes averaged 83 per cent of normal, giving promise of a production of 3,652,000 pounds.

THE Idaho State Crop Reporting Service in its July report said:

"Apples improved 3 points during June to 81 per cent of normal, forecasting a production of 4,275,000 bushels. A year ago the condition was 75 per cent, while the 10-year average is 72 per cent. Last year's production was 4,400,000 bushels. Peaches show a condition of 60 per cent of normal compared with 51 per cent a year ago and a 10-year average of 58. The estimated production is 220,000 bushels compared with 150,000 bushels harvested in 1921. Prunes are flourishing in all districts, conditions this month being 90 per cent of normal compared with 89 per cent June 1.

THE prune crop in the Walla Walla valley will be 20 to 25 per cent under that of last year, according to estimates made recently. The valley will ship from 450 to 500 carloads. Last year approximately 600 carloads were shipped. About 35 carloads of cherries will be shipped this year, the same amount as last year.

FROM El Paso, Texas, W. B. Arens, a Hood River booster, reported that strawberries from Hood River came in there in the finest of condition, though certain packs were better than others. The retail price was 15 cents or two boxes for 25 cents. Reports coming back from Chicago were to the effect that Hood River berries sold there at 11 cents, though this was attributed to a break in the market.

THE Hood River strawberry season ended with shipments of July 6. The total was 104 carloads. The berries then remaining were destined for the canneries.

THE apple estimate for the Mosier district in Oregon this year is given as 200 carloads. The district will send out about 15 cars of prunes.

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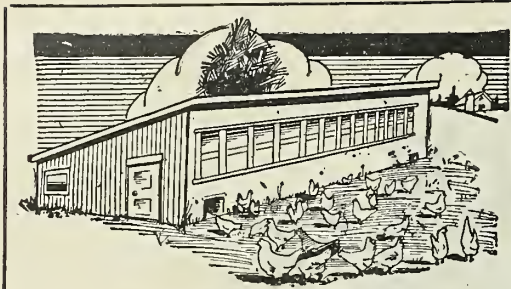
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With the Poultry

LATEST LICE TREATMENT

THERE is no fundamental reason why a flock should not be entirely freed from lice and maintained in this condition.

As poultry lice stay on the fowls nearly all the time, the only effective treatments are those which are applied directly to the birds.

The United States department of agriculture has tested a number of the materials most generally advocated for lice destruction. In this series of tests nothing was found to be as satisfactory as sodium flourid. This is a powder which can be purchased at most drug stores. It is exceedingly poisonous to all species of chicken lice, and kills both adults and young. One application of sodium flourid to all fowls on the premises will completely destroy all lice present. It is essential to make sure that the treatment is thorough and that every fowl is treated, for if one infested chicken escapes, it will in a short time reinfest the entire flock and thus make it necessary to do the work over at a considerable loss of time and money.

Sodium flourid may be applied in two forms, as a dust and as a dip. In using either form the first step is to see that all fowls are shut in the poultry house or placed in coops prior to beginning treatment.

The action of sodium flourid when applied in dust form is comparatively slow, but the material persists, and after four or five days all lice should disappear. The powder should be applied by placing a small amount of the powder (as much as can be held between the thumb and finger) among the feathers next to the skin on the head, neck, back, under the wings, on the breast, below the vent, and at the base of the tail.

As compared with dusting, dipping has an advantage in that it reduces considerably the cost of materials, is more rapidly done, and the discomfort to the operator is avoided.

Dipping should be done during the middle of a warm, sunny day or the early part of the afternoon, so the fowls will dry thoroughly before night and windy weather should be avoided. All that is necessary is a supply of fairly warm water in a tub. The water should be measured into the tub and three-fourths of one ounce of commercial sodium flourid added to each gallon of water. The tub should be filled within 6 or 8 inches of the top, and as the amount of solution is lowered through dipping numbers of fowls, water with the proper proportion of sodium flourid dissolved should be added from time to time.

It is best to hold the wings of the fowl over the back with the left hand and quickly submerge the fowl in the solution, leaving the head out while the feathers are thoroughly ruffled with the other hand so as to allow the solution to penetrate to the skin on different parts of the bird. The head is then ducked once or twice. The bird is lifted out of the bath and allowed to drain a few seconds and is then released. It is not necessary to keep the fowl under the water longer than 20 to 30 seconds and the head only an instant. By the dipping method, approximately 5.2 or 6 ounces of sodium flourid will be required for each 100 fowls.

Sodium flourid if inhaled is very irritating to either fowls or human beings. Therefore, precaution should be taken in treating fowls to see that it is not inhaled or allowed to get into any cuts or wounds in the flesh.

SEPARATE THE PULLETS

IT IS ADVISABLE, particularly with the lighter breeds, such as the Leghorns, Anconas, etc., to separate the cockerels from the pullets as soon as possible after the artificial heat has been removed. The heavier breeds, such as Reds,

Wyandottes, Rocks and Orpingtons, can be left together longer.

Pullets require a little different management than cockerels do. This is particularly true with regard to feeding and housing.

Although a pullet will grow and increase in weight a little after she has begun laying, we consider the date on which she laid her first egg as the time she matured.

Where pullets are raised and kept primarily for egg production the flock owner will wish to hasten the time of maturity as much as possible.

It is advisable to keep buttermilk or skim milk before the pullets during the growing period and even longer if possible.

Until pullets are eight weeks old they may receive equal parts by weight of oatmeal, cracked wheat and finely cracked corn for scratch. The wheat can, however, be fed to the chicks whole after they are three or four weeks old. Beginning at eight weeks the oatmeal can be gradually dropped from the ration. A little later the wheat can be dropped also. As you cut down on the oatmeal and wheat you can substitute a good grade of oats. After the chicks are three months old they will be receiving two parts, by weight of coarsely cracked corn and one of oats.

HOW CULLING PAYS

APPROXIMATELY \$40,000 was saved to poultry men in Texas last year through the work of extension workers employed co-operatively by the United States Department of Agriculture and the state agricultural college. In fourteen counties of Maine the saving was about \$1,394.40. These sums represent the money value of culling, estimated on the feed cost of one cent a day a hen.

In Maine 15,964 hens were examined in culling demonstrations and 4,648 culs removed. In Texas about 15,000 hens were culled. That this culling was successful is shown by the following figures: 19 birds were culled from a flock of 54, and in the next 7 days the culs laid only 20 eggs; 290 birds were culled from flocks totalling 846 and in the next 7 days laid 26 eggs. Of the entire number of hens culled in Maine, the percentage of egg production for the entire flock was 32.3, for the hens left after culling 40.7 per cent, and for the culs 4.5 per cent.

The number of poultry owners instructed in Maine was 3,043 and in Texas 8,000, many of whom afterwards culled their own flocks. The estimated savings represent only a part of the total value of this work. As a result of the demonstrations in one section in Maine, 79 persons eliminated 1,420 birds as culs, while in Texas the culling that resulted from all demonstrations was valued at \$125,000.

The extension agents not only demonstrated that the non-producing hen could be eliminated, but explained the method of culling so thoroughly that those present could go home and put it into practice nearly as effectively as the demonstrators themselves.

PRESERVING EGGS

EGGS preserved now while the prices are low will permit more to be sold later when every dozen counts more. Sodium silicate or water glass, is the standard preservative. First boil the water to be used and allow it to cool, after which add the water glass at the rate of 1 to 10 or 12, depending on its strength. Use only clean uncracked eggs and put them in a wooden or earthenware container. The solution may either be poured over all the eggs at once or they may be added each day. Keep them in a cool, dry, but dark cellar.

KEEP charcoal where the fowls have ready access to it at all times.

SEE that your poultry runs and coops are clean before the little chicks begin coming.

BEEKEEPERS' YEAR

By H. A. SCULLEN

Bee Specialist, O. A. C. Extension Service

THE beekeepers' year begins with August. From then on he is preparing his colonies for the harvest of the next season. At that time he should make sure that every colony is headed by a vigorous young Italian queen bred from the best. She should be provided with enough comb and stores to rear a large number of young workers to form the winter cluster. The production of at least 15,000 young workers is one of the three primary essential factors in successful wintering.

The second factor is abundance of good stores. Fortunately the leading honeys of Oregon—fireweed, alfalfa and sweet clover—are all of excellent quality for wintering. A few minor plants such as pearly everlasting are very undesirable. The bees should not be compelled to feed on honey dews. When good honey known to be free from disease is not available, only good sugar should be fed.

Feeding for the winter should be done about the close of fall brood rearing, which in most sections of the state is the latter part of October or first part of November. A thick sugar syrup made of one part of water to two and one-half parts of sugar may be fed then. The syrup must not be scorched in the process of making. One teaspoonful of tartaric acid should be added to every 15 or 20 pounds of sugar while it is being heated. Heating should be continued until all sugar is dissolved.

For a feeder there is nothing better than a friction top bucket placed bottom up on the top bars. Enough small holes should be punched in the cover to insure the entire contents being emptied in two days or sooner. An empty hive body or super should be placed on top of the hive to allow room for the feeder. The cover should then be placed on the empty hive body. If the weather is cool, place several sheets of newspaper over the frames, tearing a hole in the same large enough to fit the feeder. This will help to conserve the heat of the colony.

The minimum amount of stores which should be left with the bees in any locality is 35 to 40 pounds. It is far better to allow each colony 50 or 60 since for some reason colonies seem to winter better when there is an over-abundance of stores.

If enough stores are not left with the bees in the fall and it becomes necessary to feed during the winter, the beekeeper should use a soft candy or fondant. The following is a good recipe: twelve pounds of granulated sugar, one and one-half pounds glucose, one and one-half quarts of water, one-third teaspoonful cream of tartar.

Use only good sugar. The water should be heated and the sugar added only as fast as it will dissolve in order that it will not be scorched. The glucose may be added before or after the sugar. When the syrup comes to a boil, add the cream of tartar. As soon as the syrup comes to a good boil, remove and stir until thick enough to pour into moulds. To make the moulds take a standard Hoffman frame (wired) and nail a thin board on one side. This board may be removed when the candy is cold and you have a frame of candy which may be slipped down next to the cluster on a warm afternoon. This recipe will fill two frames.

Feeding of Strawberry Plants

(Continued from page 15)

phosphoric acid must be used in proportion to the plant's requirements than any other element.

Some of it will leach out, some will get away as a gas. Therefore, if one would give the crop enough nitrogen,

more must be applied to the soil than the crop will remove. That is, for strawberries more than 223 pounds of nitrogen must be applied during the three years of the life of the commercial planting.

In considering phosphoric acid, while

it does not leach out of the soil or get away as a gas, it goes into chemical combinations that keep a considerable portion of it continually in a form which the plant cannot use, so more of it must be supplied than 83 or more pounds that is contained in the crop. In fact, more



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Stability — Purity

The ideal truck or tractor oil must penetrate easily the smallest bearing clearances at all operating temperatures — and it must have stability. Zerolene penetrates, and has the stability to resist engine heat.

The unexcelled purity of Zerolene results in a harmless deposit of carbon of a soft, flaky nature, most of which is blown out with the exhaust. Zerolene minimizes engine troubles and assures longer useful service for your equipment.

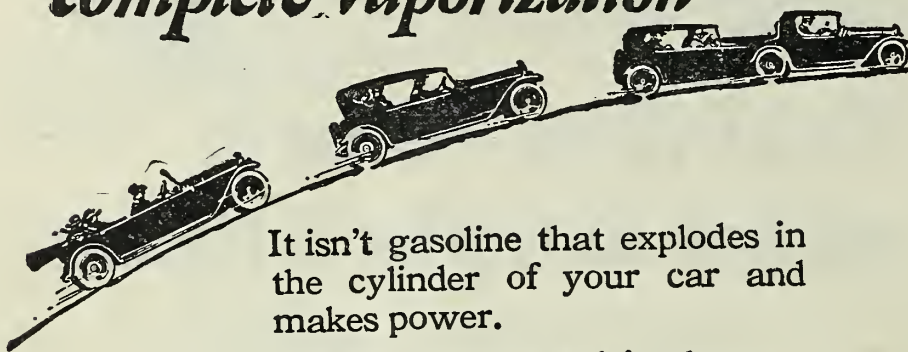
Consult the Zerolene Correct Lubrication Chart for the correct grade for your truck, tractor or automobile.

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more power & speed ~
less friction and wear ~
thru *Correct Lubrication*

More mileage— the result of complete vaporization



It isn't gasoline that explodes in the cylinder of your car and makes power.

It's gas—air, mixed in the carburetor with gasoline to form vapor.

Red Crown gasoline *vaporizes completely*. It forms a homogeneous mixture with 12 to 16 times its volume of air. That mixture explodes cleanly and powerfully, leaving comparatively little carbon residue on valves, spark plugs and cylinder walls.

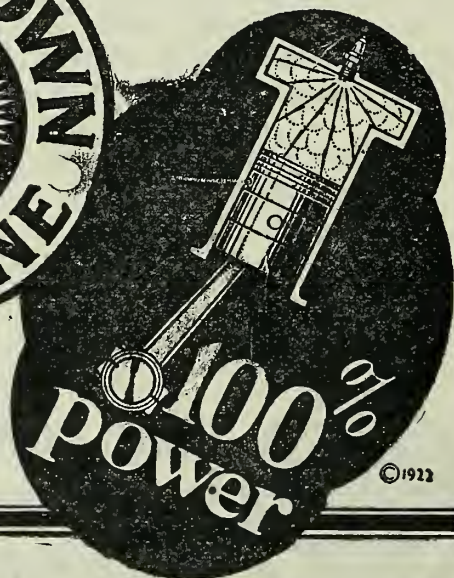
That's why you get better mileage out of "Red Crown"—and a cleaner, sweeter-running engine.

Fill at the Red Crown sign—at Standard Oil Service Stations, at garages and at other dealers.

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The Gasoline
of Quality



phosphoric acid must be used in proportion to the plant's requirements than any other element.

Potash leaches very little and it is not lost except by surface washing, but not all of it added to the soil in fertilizer can be readily taken up by the plants, because of a combinations it forms in the soil. More than 375 pounds of potash must be applied in fertilizers.

It is not unusual for a prospective fertilizer enthusiast to ask what is to become of all the plant food in his soil which was there before planting and before he applies all these pounds of added elements which he is told must be put on to get twenty thousand dollar crops from seven acres. The answer lies in availability. Most plant food in old soils is unavailable to plants, which accounts for the small results when berries are grown without liberal feeding of available fertilizer and manure.

Available plant food is that which the plant can get at once. It is that which is dissolved in the soil water, or that which is readily dissolved by the acid action of the roots. Such food is a natural "soup" for the plant. Unavailable plant food is that which is so locked up in the soil that the plant can not get at enough of it to make normal growth. It is a good thing of course, that providence locked up much of the plant food. If it had all been turned loose and made water soluble in the beginning, the rains would have washed most of it away, and there would be little held in reserve.

One kind of plant food cannot take the place of another in the sense that any one can be left out of the diet and be made up for by the others. The element in the soil that is chiefly deficient is called the "limiting factor," a sort of last hole in the belt. It limits the ability of the plant to feed on those other elements of food that are more abundant. If it is phosphoric acid that is short, the plant virtually says, "enough! I refuse to eat any more nitrogen and potash until I get more phosphoric acid." And that settles it.

For illustration: a wooden bucket with one stave broken in half determines how much water the bucket will hold, does it not? Make the stave as long as the others and you will get a full bucket of water. Just so with plant food.

Some of the reasons it pays to fertilize strawberries are that it vastly increases the yield, gives larger berries, a better color and flavor, and firmer fruit. The last named quality—firmness—enables berries to be shipped long distances to a market and arrive fresh.

It is desired to leave one idea in the mind of the reader, namely; that a complete fertilizer is as essential to success in growing any crop as a complete mixed feed is for poultry, for live stock, or for human beings.

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